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ENCYCLOPÆDIA BRITANNICA.

(NINTH EDITION.)

A DICTIONARY

OF

ARTS, SCIENCES, AND GENERAL LITERATURE.

ILLUSTRATED.

VOLUME II.

THE HENRY G. ALLEN COMPANY,
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1891.

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PREFATORY NOTE TO VOLUME II.

THIS work was designed by its Publishers to meet a demand for a Supplement to the *Encyclopædia Britannica* which should contain fuller information on American topics and on other subjects in which the large body of American readers are interested. The generous reception accorded to the first volume of the new undertaking, and the tributes of approval from subscribers to the various editions of the *Encyclopædia Britannica* and from disinterested critics of the highest rank, have been duly appreciated by the Editors and Publishers of this work, and have stimulated them to carry out the same plan in the preparation of the second volume. The work has been executed under the same editorial care, with the assistance of an able corps of contributors, most of whom are specialists in the various departments or topics assigned to them.

In the present volume the articles on American geography, natural history, scientific research, and whatever relates to the vast resources and rapid development of this country, will be found adequate to their theme.

The articles on Charcoal, Clay, Coal, Coke, Cotton, Crop Reports, and Dairy Products, occupy a large space, but not disproportionate to their practical importance to the public.

The religious denominations have generally been treated by prominent members of each and embody a complete view of their history, doctrines, and latest statistics. In the case of some smaller religious bodies it has been deemed advisable to intrust the work of gathering information and preparing the several statements to one who is justly noted for his wide and accurate information in this department.

In the department of biography prominence has been given to those distinguished in literature, and an estimate of their works is included in the sketches. The lives of men of note in American history and in recent European history have been treated with due regard to their influence on public affairs.

Various philosophical subjects which have been omitted in the *Encyclopædia Britannica* will be found discussed at length by competent critics.

The results of recent research and exploration in various parts of the world have been carefully embodied in articles which will be found instructive and interesting.

A list of contributors to the present volume, including the Editors of the several departments, is appended, and it is trusted will be found to sustain the reputation established by the first volume, and to justify the high claim made for the literary excellence and great importance of the entire work.

LIST OF CONTRIBUTORS TO THE SUPPLEMENT.

VOLUME II.

This list embraces the names of those contributors whose names are signed (by their initials) to articles in the present volume.

Where two or more contributors have the same initials, a distinction has been made in printing them, which will enable the reader to assign to each his own work.

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SUPPLEMENT
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BROWN.

BROWN, FORD MADOX, an English painter, was born at Calais, France, in 1821. He is a grandson of Dr. John Brown of Edinburgh, the founder of the Brunonian theory of medicine. He secured his education on the Continent, and his art-studies were made in the schools of France and Belgium. In 1844 and 1845 he contributed cartoons of The Finding of the Body of Harold, Justice, and other subjects to the competitive exhibition in Westminster Hall for the frescoes of the houses of Parliament. Brown, thanks to his continental schooling, was a much better trained artist than almost any of his English professional brethren of that day. Haydon was one of the few to perceive the merits of his designs, and he was generous enough to pronounce cordially in their favor. The designs also excited the warm admiration of Dante Gabriel Rossetti, then a boy of about seventeen years of age. Rossetti, recognizing in Brown's pictures sincerity of purpose and the faculty of penetrating to the heart of a subject, applied to him for instruction. Brown, who had always refused pupils, offered Rossetti the freedom of his studio. Thus began a firm friendship and a close intimacy which lasted until the death of Rossetti. A few years later, when the Pre-Raphaelite Brotherhood was organized under Rossetti's lead for the avowed purpose of bringing English art back to the paths of sincerity and truth, Brown was solicited to connect himself with it, but declined to do so on the ground that he had a dislike for coteries. But the public almost from the first rated Brown as a Pre-Raphaelite, and was justified in doing so, not only by his peculiar selection and treatment of subjects, but by his manner of painting, though he never indulged in the extravagances which marked the performances of some of the reformers themselves. His work was at all times serious, dignified, and really learned, while occasionally it was powerful or profoundly pathetic. Soon after the Westminster Hall competition Brown went to Italy. On his return to England he painted Wycliffe reading his Translation of the Scriptures, which was exhibited in 1848. The year following he exhibited King Lear, and in 1851 Chaucer reciting his Poetry at the Court of Edward III. His Christ washing Peter's Feet was exhibited in 1852. In 1865 he opened in London a special exhibition of his works, composed of about one hundred pieces, half of which were finished pictures and the rest cartoons and sketches. This collection included some of his important performaces, such as The Last of England, Autumn Afternoon, Wilhelmus Conquistator, and a composition entitled Work, upon which he had been engaged for several years. This exhibition found the public better prepared to judge with appreciation than it was at the time of the Westminster Hall competition. Among the more important of Brown's recent works are The Coat of Many Colors, Cordelia's Portion, Elijah and the Widow's Son, Romeo and Juliet, The Entombment, Don Juan, Jacopo Foscari, and Cromwell dictating his Despatch to the Duke of Savoy against the Cruelties to the Vaudois Protestants. For some years Brown has been engaged on the frescoes of the Manchester town-hall illustrating the history of that city. Four are finished, representing The Romans, The Baptism of Eadwin The Expulsion of the Danes, and The Establishment of the Flemish Weavers by Queen Philippa. Others are to represent Crabtree observing the Transit of Venus and The Edict of the Court-Leet for the Testing of Weights and Measures in 1556. His son, Oliver Madox Brown (1855–1874) was noted for precocity as a painter and author. (W. J. C., JR.)

BROWN, GEORGE (1818–1880), a leader of the Reform party in Upper Canada (now Ontario), born in Edinburgh, Scotland, Nov. 29, 1818. He was educated at the High School and Southern Academy in that city. In 1838 he emigrated with his father to New York, where he first became known to the public as publisher of the *British Chronicle*, a journal established by his father in 1842. Visiting Canada in 1843 in the interests of that paper, Mr. Brown made a very favorable impression upon the minds of leading members of the Liberal or Reform party, and, as the result of overtures made him, the publication of the *British Chronicle* was given up, and the *Banner* shortly after established in Toronto. In 1844 the first number of the *Globe* was issued, a paper with which Mr. Brown's name was associated to the last, and which became the chief instrument of his power and one of the most potent factors in Canadian politics. Commencing as a weekly, it became in 1846 a semi-weekly, in 1849 a tri-weekly, and in 1853 a daily. By means of it the young Liberal threw himself with immense energy into the conflicts in which his party was engaged. The years immediately following its establishment were years of constitutional crisis in the Canadas, and his trenchant and powerful articles defended responsible government and representation by population, and opposed whatever savored of State-Churchism.

Mr. Brown was frequently solicited to enter Parliament, and did so in 1851 as member for Kent. He continued to represent this or another constituency until 1867, with an interval of a year or two after 1861. He seems, however, never to have been eager for parliamentary honors, believing he could better serve his party by devoting his whole strength to the *Globe*. Having, in the general election of 1867, been defeated in a chivalrous effort to wrest a doubtful constituency from a very strong Conservative candidate, he declined all the many offers made him of other safe constituencies, and steadily refused all subsequent solicitations to re-enter Parliament. While in Parliament he exerted a marked influence; he was at first tacitly, and then formally, recognized as the leader of the Upper Canadian reformers. This position he continued virtually to hold until his final retirement.

In 1873 he was offered and accepted a seat in the Dominion Senate. In 1874 he went to Washington as plenipotentiary of the Canadian Government to aid Sir Edward Thornton in negotiations for a new treaty of reciprocity. Mr. Brown was cordially received by the Government and public men of the United States, but the draft treaty agreed to by him and his colleague, and by Mr. Fish on behalf of the United States, fell

through, in consequence of the refusal of the U. S. Senate to consider it. The valuable paper entitled *Memorandum on the Commercial Relations of the British North American Provinces with the United States* was written by Mr. Brown. In 1875 he declined the position of lieutenant-governor of Ontario.

In 1880 he was shot in the thigh by a former employé of the *Globe* office who had been discharged for neglect of duty. His death, on May 9th, after weeks of lingering, called forth demonstrations of respect and sorrow from people of all classes and all parties. (J. E. W.)

BROWN, Henry Kirke, an American sculptor, was born at Leyden, Mass., in 1814. He for some three years studied painting with Chester Harding, the portrait-painter. While with Harding he had occasion to model a bust, and this experiment inspired such a liking for sculpture that he decided to apply himself mainly to that art. He never, however, entirely relinquished work with the brushes, and is accounted a painter of more than common excellence. Brown studied anatomy in Cincinnati, where he went in 1837, and while in that city he achieved his first marble bust. In 1840 he came East again, and, residing chiefly in Albany and Troy, N. Y., made a great number of busts. He went to Italy in 1840, and remained there four years, during which time he modelled his ideal statues of Daniel, Ruth, Rebecca, David, and so on. Brown's first really important performance, however, was the equestrian statue of Washington in Union Square, New York City. This statue was modelled in Brooklyn, and is a very superior performance. It was cast at the Chicopee foundry, Mass., and is notable for being the first important piece of bronze statuary made in the United States. If the Washington is a success, the bronze statue of Lincoln by Brown, also in Union Square, sins against the first law of sculpture by being out of poise. But, apart from this, the artist has found the ungainly personality of Mr. Lincoln an artistic problem beyond his powers. He has aimed at a certain conventional dignity, but he has achieved anything but a dignified result. The equestrian statue of Gen. Scott, which has been erected on a prominent site at Washington, is treated in a very different manner from the Union Square Washington, and at first glance it is somewhat disappointing on account of a certain suggestion of stiffness in both horse and rider; but it is assuredly one of the very few pieces of sculpture at the national capital which satisfy high artistic requirements. Brown is the maker of another statue of great merit at Washington—that of Gen. Greene in the Hall of Statuary in the Capitol. This is one of the very few fairly sufficient works which that hall up to the present time contains. In 1858, Brown was engaged by the State of South Carolina to make a group for the pediment of the State-House at Columbia. He was employed upon this commission at the time of the breaking out of the Civil War, and when Columbia was burned near the close of the war all of his properties, including several completed statues, were destroyed. This calamity was a severe blow to the artist. He, however, returned to his home in the North, and, applying himself diligently to work, executed a number of commissions, the most important of which have been referred to above. He died July 10, 1886.

BROWN, John, LL.D. (1810–1882), a Scotch physician and essayist, best known as the author of *Rab and his Friends*, was born at Biggar, in Lanarkshire, Sept. 22, 1810. He was the great-grandson of Rev. John Brown of Haddington, a minister of the Secession Church, who had risen by his own exertions from the humble lot of a shepherd-boy and attained a high reputation for learning. His *Dictionary of the Bible* and other helps to the study of the Scriptures were long held in high esteem. His son, Rev. John Brown of Whitburn, and especially his grandson, Rev. John Brown, D. D., of Edinburgh, followed in the footsteps of the founder of the family, and helped to maintain the scholastic and theological reputation of the Secession (afterwards the United Presbyterian) Church. Rev. Dr. Brown's son, John, turned aside from the usual career of the family to enter the medical profession. He received his education at the High School and University of Edinburgh, where he also pursued his medical studies and received his degree in 1833. For a year he was assistant to a surgeon at Chatham, where his courage and faithfulness during an epidemic of cholera are said to have attracted the notice of Charles Dickens. Settling in Edinburgh, he was abundantly occupied in the practice of his profession, yet some of his leisure he devoted to literature, sketching with the hasty touch of genius humorous and pathetic scenes and characters. In this way *Rab and his Friends* was written when the author was forty-eight years old, and but little known outside the circle of his personal friends. The sketch, taken from his own experience, was read first to a rustic audience, upon whom it fell flat. Immediately upon its publication, however, the power and pathos of the narrative and the homeliness and sympathy of the style gave it general popularity. From the *North British Review*, *Good Words*, and other periodicals Dr. Brown now gathered some of his contributions into a volume under the title *Horæ Subsecivæ* (1858), which has been wittily translated "Brown Studies." More being called for, a second series followed in 1861, while an American edition appeared with the title translated *Spare Hours*. In all of Dr. Brown's writings shrewd observation and practical philosophy are mingled with warm and tender feeling. He was a passionate lover of Nature and humanity, and delighted to portray dogs and children. His sketch of *Marjorie Fleming*, the child-friend of Sir Walter Scott, is his most popular and pathetic piece, except *Rab*. He was also accomplished in art, and his criticisms in that department are considered valuable. In 1874 the University of Edinburgh conferred on him the honorary degree of LL.D., and in 1876 he received a pension of £100 from the civil list. Prior to this his health had failed, and, his mind having suffered from attacks of melancholy, he had ceased to write, but his wants were supplied by generous friends, who placed to his account the sum of £6000. In his last year his former brightness returned, and he revised for publication a third collection of his writings, called *John Leech, and Other Papers* (1882). Scarcely had the volume appeared when his health again failed, and he died of pleurisy, May 11, 1882. As a practising physician he was a friend to his patients, both poor and rich; his kindly heart gave him an insight of sympathy into the dark, sad problems of humanity. His conversation evinced deep thought and earnest sensibility; his wit was keen, but genial. Among his biographical sketches there is none more interesting than that of his father in his *Letter to Rev. Dr. Cairns*. His notice of *Thackeray's Death* is a truly touching obituary. The American edition of his writings in three volumes, under the title *Spare Hours*, does not correspond in arrangement with the Edinburgh edition.

BROWNE, Hablot Knight (1815–1882), an English book-illustrator and caricaturist, who signed him-

self "Phiz," was born in 1815. He first came prominently into public notice as the illustrator of *Pickwick Papers* after the death of the artist Seymour, who made the designs for the opening chapters of the work. A disagreement between Dickens and Cruikshank after the publication of *Oliver Twist* led to a re-engagement with Browne, and to his supplying the illustrations for most of the novels written by Dickens during his best period. Cruikshank accused Browne of being an imitator of his style; but there is an appearance of spontaneity about the best designs of Browne which seems to forbid the idea that he was a deliberate imitator of anybody. In the treatment of coarse subjects he goes beyond the coarseness of Cruikshank, and he frequently carries the grotesque into the regions of burlesque. In the handling of serious themes Browne is in every way Cruikshank's inferior. Browne's happiest performances are his representations of the humorous scenes and the humorous characters of Dickens and Lever. The rollicking humor of Lever and the eccentric characterizations of Dickens secured in him a sympathetic interpreter, and his reputation chiefly rests upon the designs which he contributed to the works of these two writers. Browne contributed designs to the Abbotsford edition of Scott's novels, to an illustrated edition of Byron's works, and to many other publications. Most of Browne's best illustrations were made by the aqua-fortis process, which he managed with a skill sufficient for his purposes. Died at Hove, Sussex, July 8, 1882. (W. J. C., JR.)

BROWNELL, HENRY HOWARD (1820–1872), an American lyric poet, was born at Providence, R. I., Feb. 6, 1820. He was the son of Dr. Pardon Brownell, and a nephew of Bishop Brownell. He graduated at Washington (now Trinity) College, Hartford, in 1841, and studied law, but engaged in teaching and authorship. In 1847 he published a volume of poems which was well received. He afterwards composed some popular histories, as *Pioneer Heroes of the New World* and a *History of the War of 1812*. He entered the army in 1861 as a volunteer, and his varied experience brought his true genius to light. He wrote several spirited lyrics, which were collected and published under the title *Lyrics of the Day; or, Newspaper Poetry by a Volunteer in the United States Service*. In 1863 he entered the navy, and served as ensign on Admiral Farragut's staff, and after the war accompanied the admiral to Europe. He resigned in 1868 and returned to Hartford. His last publication was *War Lyrics, and Other Poems*. He died at Hartford, Oct. 31, 1872.

BROWNELL, THOMAS CHURCH, D. D., LL.D. (1779–1865), bishop in the Protestant Episcopal Church, was born at Westport, Mass., Oct. 19, 1779. He was educated at Rhode Island College (now Brown University) and Union College, where he graduated in 1804. He continued at Union College after graduation as tutor and professor of belles-lettres and moral philosophy, and in 1809 was chosen professor of chemistry and mineralogy. He visited Europe to procure the necessary apparatus and appliances, and returned after a year's absence. In 1813 he became an Episcopalian, began to study for the ministry, and was ordained by Bishop Hobart, April 11, 1816. He still continued to act as professor in Union College, and performed missionary labors in the country adjoining. In 1818 he became assistant minister in Trinity Church, New York, where he was ordained. He was consecrated bishop of Connecticut, Oct. 27, 1819, and entered vigorously on his work. He was founder of Washington (now Trinity) College, Hartford, and its first president from 1824 to 1831. On the death of Bishop Chase of Illinois in 1852 he became presiding bishop. He died at Hartford, Conn., Jan. 13, 1865. He wrote *The Family Prayer Book*, a complete commentary on the service of the Episcopal Church, and also compiled several volumes of extracts on devotional and practical piety under the title of *Religion of the Heart and Life*.

BROWNING, ROBERT, an English poet, was born at Camberwell, a suburb at the south of London, on May 7, 1812. His father was a clerk in the Bank of England and a dissenter. When only eight years old the boy made humorous translations in verse from Horace, and four years later was trying in vain to find a publisher for some poems that were remarkable only for their Byronic fervor. His enthusiasm for Byron soon waned before the influence of Keats and Shelley, with whose works he first became acquainted in 1825. During all this time he had been attending a day-school at Peckham; in his fourteenth year he began to study with a tutor, and then entered the former London University (now University College), but did not remain to take a degree. Browning's father, who never learned to take unmixed delight in his poems, had yet been greatly impressed by his powers of mind, and now left to his discretion the entire direction of his future life and relieved him from any necessity of choosing a profession. For some time young Browning was occupied with poetical plans, noticeably with one for a series of epics illustrating the "life of typical souls," but without any immediate result. In 1832 he wrote *Pauline*, a strained and immature poem that, with some autobiographical touches, described the progress of a philosophic life; it was published anonymously in 1833, and not included among his authorized works till 1868. In 1834, Mr. Browning travelled for the greater part of a year on the continent of Europe, making a stay of some months at St. Petersburg, and lingering long in Italy, where his explorations in the monastic libraries of Lombardy and Venice furnished him with the intimate knowledge of mediæval thought and history that appears in *Sordello* and "The Bishop Orders his Tomb at St. Praxed's Church." His peculiar genius was first shown in this year in two lyrics contributed to Fox's *Monthly Repository* under the title of "Madhouse Cells," and now reprinted in *Dramatic Lyrics* with the sub-titles "Johannes Agricola in Meditation" and "Porphyria's Lover." In "Porphyria's Lover" is found that intensely vivid description, in the form of a semi-dramatic soliloquy, of intellectual or emotional perversion, that Mr. Browning so often attempted, but never with more perfect performance. In the winter of 1834, in London, *Paracelsus* was written, and in the following year published. An accidental acquaintance with Macready the actor led to the writing of *Strafford*, which was produced with considerable success in May, 1837, at Covent Garden Theatre by Macready, supported by Vandenhoff and Helen Faucit. During the three years following, *Pippa Passes*, *King Victor and King Charles*, *The Return of the Druses* (which was at first called *Mansour, the Hierophant*), and *Sordello* were composed, and in 1840 *Sordello* was published. Between 1841 and 1846 the series known as *Bells and Pomegranates* appeared in a cheap pamphlet form in eight numbers, beginning with *Pippa Passes* and ending with *Luria* and *A Soul's Tragedy*. Of Mr. Browning's plays, *The Blot on the 'Scutcheon* was acted in 1843 at Drury Lane Theatre, and *Colombe's Birthday*, with Miss Faucit in the

leading part, in 1853, at the Haymarket.

Sept. 12, 1846, Mr. Browning, after a romantic courtship, married Elizabeth Barrett Barrett, against the wishes of her father. The two poets went immediately to Italy, and, with occasional visits for health to Pisa, made their home at Florence in the Casa Guidi palace, that Mrs. Browning's poem has made a household word. In 1849 the first collected edition of Mr. Browning's poems was published in London and in Boston, and in the next year, in London, *Christmas-Eve and Easter-Day*. In 1852 he wrote for Mr. Moxon the publisher an enthusiastic introductory essay to a collection of Shelley's letters, but suppressed it on the discovery by Mr. F. T. Palgrave that the letters were spurious. *Men and Women*, in 1855, was the only other production of Mr. Browning during his stay of fifteen years in Italy, but the poet's brain was not idle, and many of the Italian scenes of *The Ring and the Book* must have been already taking definite form. In 1859 and 1860, Mr. Browning took friendly charge of Walter Savage Landor, then in the decline of his splendid powers. In 1861, Mrs. Browning died, and her husband returned to England.

Dramatis Personæ was published in 1864. In 1867, Mr. Browning was created an honorary M.A. of Oxford, and elected to an honorary fellowship at Balliol College. In 1868–69, *The Ring and the Book* came out in two successive volumes, and was by many critics accepted as a masterpiece. Mr. Browning's later publications were *Balaustion's Adventure: including a Transcript from Euripides*, and *Prince Hohenstiel-Schwangau, Saviour of Society* (1871); *Fifine at the Fair* (1872); *Red Cotton Night-Cap Country* (1873); *Aristophanes' Apology* (1875); *The Inn-Album; Pacchiarotto, or How he Worked in Distemper* (1876); *The Agamemnon of Æschylus* (1877); *La Saisiaz: The Two Poets of Croisic* (1878); *Dramatic Idyls* (1879); *Dramatic Idyls, Second Series* (1880); *Jocoseria* (1883); *Ferishtah's Fancies* (1885); *Parleyings with Certain People of Importance* (1887); *Asolando: Facts and Fancies* (1889). He died at Venice, Dec. 12, 1889, and was buried in the Poets' Corner of Westminster Abbey.

Robert Browning was the successor of Shelley and Byron in continuing "the battle of will against the social forces of a dozen centuries." The aim of generations had been to make human nature orderly and conventional; now, natural impulses and force of character were regarded as something divine. The poets of the so-called "Spasmodic School," with whom Mr. Browning must be classed, carried on the work of the Revolutionary poets by elevating the eccentricity of genius above literary canons, and by substituting the independent authority of the individual will for the conception of social obligation. The egotism of the speaker in *Pauline*, of Paracelsus, of Festus in Mr. Bailey's poem, of Walter in Alexander Smith's *Life-Drama*, and of Sydney Dobell's Balder, is only another form of the egotism of the Byronic Corsair, with his longing for "life unconditioned" transferred from the world of action to that of thought, and their aspiration for infinite love or superhuman knowledge is only a more dramatic presentment of Shelley's visionary ideals. Mr. Browning's juvenile design of representing in a series of monodramatic epics "the life of typical souls" describes with precision the aim of all the writers of this school. Their heroes are all philosophers or poets endowed by hypothesis with transcendent genius, and manifesting a self-confidence and self-consciousness scarcely less extraordinary; indeed, of each author it was suggested that his hero was only a colossal shadow of himself. These poets, like Carlyle, who was inspired by the same influences, were rather inclined to adopt the attitude of seers and a symbolical and elliptical style, with some contempt of the critics, who found it hard to comprehend. Mr. Browning's attitude towards his critics is shown with great definiteness in *Pacchiarotto*. At this time Mr. Browning was far from being realistic: in *Paracelsus* the historical facts are confessedly distorted, and in *Sordello* his Italian travels and studies produced nothing but a background of confused history and a few lines of splendid description of Verona and the Mincio; as in *Festus* or *A Life-Drama*, there is no plot, no variety of characters, but everything is subordinated to the development of the typical soul. In *Paracelsus* the hero's endeavor to attain infinite wisdom is supplemented by the longing for love of the Shelley-like poet Aprile, and in *Sordello* a perfected Paracelsus, "with conscious power and not mere aspiration," is placed before the practical duties of a reformer of society. These heroes both die with their hopes unfulfilled, but each is called by Mr. Browning successful—Paracelsus, because he came to see that knowledge without love is vain; and Sordello, because he died at the moment of conquering the temptation to combine his vast designs for human happiness with the selfish purposes of a faction. The keynote to these poems is struck by a line in *Red Cotton Night-Cap Country*: "Success is naught, endeavor's all." Though its vagueness and lack of proportion were criticised as immature, *Paracelsus* had, by its many beautiful similes and one fine lyric, excited great hopes of Mr. Browning's future performances, but these hopes were disappointed by *Sordello*, which was a hieroglyphic to the world of letters, and remains unintelligible to the many, though studied by a few with untiring and reverent curiosity. It may be said, perhaps, to be in poetry very much what *Sartor Resartus* is in prose.

Some trace of romanticism reappears in all Mr. Browning work, leading to a choice of improbable situations, as in a *Blot on the 'Scutcheon*, and to improbable explanations of conduct, as in *The Ring and the Book*. It distinguishes his ethical position from that of George Eliot, with which it has many points of contact. Both authors are impressed by the purifying power and spiritual necessity of emotion and high intellectual ideals. Mr. Browning reminds us of George Eliot when he shows how the poor gypsy hag in the "Flight of the Duchess" is herself made great by the greatness of her human sympathy, or how the unsuspected sweetness of Caponsacchi's character in *The Ring and the Book* is drawn out by his mighty though unpriestlike passion. But George Eliot insists on the importance of ethical duties imposed by natural laws, by the necessities of race, or created by contact with other people, while Mr. Browning, like Shelley, makes human progress depend chiefly on man's endeavors towards unattainable ideals and on his moments of intense feeling.

What distinguishes Mr. Browning's work from that of other poets is its intellectual quality. His emotions and imagination are dominated by a subtle, nimble, analyzing intelligence. No poet since Dryden has reasoned so well in verse. In *Christmas-Eve and Easter-Day* a long metaphysical argument is perfectly presented; in *The Ring and the Book* Pompilia's innocence is defended with the power of an Erskine or a Choate. He delights in making a keen, clever man support a paradoxical or untenable position with plausible casuistry, as in Djubal in *The Return of the Druses*, in "Bishop

Bloughram's Apology," "Mr. Sludge the Medium," and *Prince Hohenstiel-Schwangau*, where a singular argument is made for the Italian policy of Napoleon III. These various apologetic poems are illustrations of Mr. Browning's theory that a man's character is determined as much by what he thinks he is or pretends to be as by what he actually does—a corollary of the moral of the early poems: "Success is naught, endeavor's all." Mr. Browning has a wonderful faculty of perceiving at once, and usually without emotion, all the possible motives that lead to action; he is impressed by the complexity of modern character, and is contented to describe it without deciding on questions of morality: when he does give judgment, as in *Ivàn Ivànovitch* or in *The Ring and the Book*, there are always sufficient reasons given for a dissenting opinion. This extraordinary intellectual activity and suggestiveness often leads Mr. Browning to impute the motives of a clever man of the present day to the simpler characters of antiquity or of the Middle Ages. In translating the "Alcestis," in *Balaustion's Adventure*, he inserts a most unhellenic defence of Admetus. Even little Pippa becomes at times somewhat metaphysical. Luria speaks in Mr. Browning's phrases, not in his own: Othello observed better the possible limits of the Moorish intellect.

Mr. Browning's dramatic power is, consequently, most frequently shown in a vivid perception of a tragical situation that is described in a semi-dramatic monologue, as in many of the *Dramatic Idyls* and in the short expressions of individual character that form the greater number of the *Lyrics*. But in the great tragedies, *The Return of the Druses* and *King Victor and King Charles;* in that brilliant comedy, *Colombe's Birthday;* in the wonderful lyrical drama, *Pippa Passes;* and in the three scenes of *In a Balcony*,—dramatic art almost reaches perfection. In these plays there is an harmonious development of the plot that is rare in modern work. The impressiveness of the tragic catastrophe in *The Return of the Druses* and in *Luria* recalls the stern intensity of the Elizabethan dramatists. Mr. Browning is naturally a great dramatic poet who has fallen upon an undramatic age, and the modern spirit has reacted upon him by stimulating the intellectual and humorous sides of his nature and repressing his imagination. The change that has taken place in prose literature during the last fifty years is reflected in Mr. Browning's poems. Romantic interest in the individual has been succeeded by a scientific observation of the complex relations of different characters. Such a poem as *A Soul's Tragedy* or *The Ring and the Book* is the counterpart of the psychological novel, and for this method of representing life a purely lyrical or dramatic form is inadequate. When Mr. Browning began to write, the novel had not yet been fashioned into the flexible instrument of expression it has become in the hands of George Eliot, and his later works, *Fifine*, *The Inn Album*, *The Ring and the Book*, *Red Cotton Night-Cap Country*, show by their uncouthness the attempt of a powerful mind, overburdened with thought, to say in verse what a later writer of similar genius must say in prose.

Though most of Mr. Browning's lyrics are semi-dramatic, and primarily intellectual conceptions of character cast into a lyrical form, there are few songs more stirring than his "Cavalier Tunes," or more full of clear and rippling music than the songs of Pippa, or than "Home Thoughts from Abroad" or "Misconceptions." One must turn to *Romeo and Juliet* to find a more melodious expression of pure and passionate love than "In a Gondola." The love-songs of few other poets pierce the heart with more unerring certainty; they have an unrelenting sweetness that the world has not heard since Shelley and Landor died; but it is only at times, in "The Lost Mistress," "A Woman's Last Word," and in the poems written to his wife, "By the Fireside" and "One Word More," that this harsh voice becomes tender.

It may have been the romantic taste of the time that first induced Mr. Browning to select his subjects from the history of the Middle Ages. But a breadth of vision distinguishes his mediæval studies from those of the so-called pre-Raphaelite poets: it is character rather than its environment that he describes, and in character what is not merely accidental or temporary. The mediævalism of the early poems served simply as a background for a Paracelsus or a Sordello, and in *The Ring and the Book*, though the Italy of the time is painted with minute accuracy, there is the element of universality that appears in *Romola*. In many of his recent works not even the setting of the poems is taken from the past. Of the translations from the Greek it is enough to say that the "Transcript from Euripides" in *Balaustion's Adventure* is, with the exception of some attempts at modernization, a most poetical and accurate reproduction of the *Alcestis;* that the translation of the *Hercules Furens* in *Aristophanes' Apology* has less merit, though it is less of a paraphrase; while in *The Agamemnon* the most notable thing is the extreme skill with which every obscurity in the original has been retained.

Mr. Browning's style is usually defined as "difficult" and "obscure." A comparison of *Pippa Passes* with the *Two Poets of Croisic*, or of *Balaustion's Adventure* with *Aristophanes' Apology*, show that it is when Mr. Browning's intellect, instead of his emotion or imagination, is directing his pen that his style becomes difficult and the rhymes harsh: then all the possible arguments and illustrations seem to occur to him at once, and he transfers them to his paper with lightning rapidity, apparently with all the associations, half-guesses, and mental processes that accompanied their first conception. Mr. Browning is said to have confessed that he was weary of the conventional set of symbols and tried to use new ones. It is certain that his style indicates a reaction against the school of Keats, and that the existence of a modern school of poets who too often sacrifice sense to sound is partly accountable for the grotesque extravagances of "Pietro of Abano" and *Pacchiarotto*. Mr. Browning has always taught that poetry depends on the thought and not on the expression. and he has chosen his words accordingly, without regard to their beauty or vulgarity. In "The Englishman in Italy" the effect of this tendency is seen in the extreme freshness and accuracy of his descriptions. No writer has ever used single words with greater effect or condensed as comprehensive meaning in so few. To a student Mr. Browning is perhaps never unintelligible; when read aloud even "Halbert and Hob" becomes clear; and that he can speak, when he chooses, to the people in their own language is proved by the popularity of his ballads, "The Pied Piper of Hamelin" and "Hervé Riel." (G. P.)

BROWNLOW, WILLIAM GANNAWAY (1805–1877), a Methodist preacher, journalist, and politician, was born in Wythe co., Va., Aug. 29, 1805. He was left an orphan at an early age, and learnt the carpenter's trade. In 1826 he entered the Methodist ministry, and was an itinerant preacher for ten years. He also took

part in politics, advocating the re-election of John Quincy Adams to the Presidency in 1828. At a later period, in South Carolina, he openly opposed the nullification scheme, and when denounced by his opponents published a pamphlet in defence of his course. In 1837 he began to edit the *Knoxville Whig*, in connection with which he became noted for his violent and unscrupulous denunciation of his political opponents, and acquired the sobriquet of "the fighting parson." Rev. J. R. Graves, editor of the *Tennessee Baptist*, published in 1856 a severe attack on the Methodist Episcopal Church under the title *The Great Iron Wheel; or, Republicanism Backwards and Christianity Reversed.* Mr. Brownlow published a reply called *The Iron Wheel Examined, and its False Spokes Extracted.* In 1858 he visited the North, and held a public discussion in Philadelphia with Rev. A. Pryne of New York, maintaining the expediency and divine right of slavery. When the secession of the Southern States was agitated, he opposed it with characteristic vehemence, on the ground that slavery would be thus overthrown. When the ordinance of secession was passed in Tennessee, he was obliged to suspend the publication of his paper, Oct. 24, 1861, and take refuge in the mountains. After remaining some time in concealment, having received word that a passport would be given him to leave for the North, he returned to Knoxville, where he was arrested, Dec. 6, 1861, on a charge of treason to the Confederacy, and imprisoned until the following March. He was then sent within the Union lines at Nashville, and his family were afterwards driven from their home. He made a tour through the North, delivering addresses in the principal cities, and also published *Sketches of the Rise, Progress, and Decline of Secession, with a Narrative of Personal Adventures among the Rebels*, which had an immense circulation. This volume was generally called "Parson Brownlow's Book," and its thrilling narratives of the sufferings of the Union men of East Tennessee, as well as his fierce denunciations of Southern leaders, did much to excite popular indignation in the North. In 1864 he returned to Tennessee, re-established his paper, and was elected governor of the State. In 1869 he was elected United States Senator. He died at Knoxville, Tenn., April 29, 1877.

BROWNSON, Orestes Augustus, LL.D. (1803–1876), an American philosopher and theologian, was born at Stockbridge, Vt., Sept. 16, 1803. While a scholar at an academy at Ballston, N. Y., he joined the Presbyterian Church, but afterwards changed his views, and in 1825 became an advocate of Universalism. Having formed the acquaintance of Robert Owen and adopted his ideas of socialism, Brownson tried to form in New York a workingmen's party. Then falling under the influence of Rev. Dr. Channing, he became a Unitarian, and was for a time pastor of a congregation. In 1836 he formed in Boston a "Society for Christian Union and Progress," and published his *New Views of Christianity, Society, and Church.* In 1838 he established the *Boston Quarterly Review*, in which he was almost the sole writer. He did not profess to support any particular system or creed, but to prepare the way for great and radical changes in existing systems. In 1840 he published *Charles Elwood; or, The Infidel Converted*, which was a philosophical essay in the form of a novel. In 1843 he abandoned preaching and merged his *Review* in the *Democratic Review* of New York, to which he engaged to contribute, but his articles were too philosophical for his new readers, and the engagement terminated in a year. In 1844 he became a Roman Catholic, and thereafter remained a layman in that faith. He now commenced the publication of *Brownson's Quarterly Review*, in which he especially defended the doctrines and practices of the Roman Catholic Church, but also discussed literary, social, and political questions. In 1855 he removed to New York City. During the war the publication of his *Review* was suspended, but it was resumed in 1873 and continued till his death. He was invited by Dr. Newman and others to a professorship in the Catholic University in Dublin, but he declined the offer. He died at Detroit, Mich., April 17, 1876. Besides the *Review*, which was written almost exclusively by himself, he published *The Spirit-Rapper*, 1854; *The Convert; or, Leaves from my Experience*, 1857; *The American Republic, an Examination of its Constitution, Tendencies, and Destiny*, 1865; etc. His complete works are now being published in Detroit.

BROWN-SÉQUARD, Édouard, an eminent French physiologist, was born in the island of Mauritius in 1818. He was a son of Edward Brown (a native of Philadelphia, U. S.) and a French lady named Séquard. He studied medicine in Paris, where he graduated as M. D. in 1840. He gained distinction by his experiments and researches in physiology, especially on the composition of the blood, animal heat, the spinal cord, the muscular system, and the sympathetic nerves, and made important discoveries in pathological anatomy. He received several prizes of the French Institute for his contributions to science. He was a professor in the medical department of Harvard University 1864–68. In Jan., 1869, he was appointed professor in the School of Medicine in Paris. He delivered several courses of lectures in England and the United States. In 1873 he established a medical journal in New York. In August, 1878, he succeeded Claude Bernard as professor of medicine in the College of France. He was for many years prominent as a conductor of medical journals, and in these most of his scientific papers appeared. In 1889 he excited sensation by his experiments in inoculation with what he called the "elixir of life." He published *Lectures on Functional Nervous Affections* and on *Paralysis.*

BROWNSVILLE, a port of entry and the county-seat of Cameron co., Texas, is on the E. bank of the Rio Grande, 28 miles from its mouth, and nearly opposite Matamoros in Mexico. It is connected with Point Isabel, 22 miles distant, by the Rio Grande Railroad. There is also a line of steamboats plying to Roma, the head of navigation on the Rio Grande. It is supported chiefly by trade with Mexico, *viâ* Brazos Santiago; the traffic of Matamoros (amounting in 1881 to $3,937,917) passes through it. It has a college, an efficient system of public schools, a U. S. custom-house, three churches, a convent, a daily and a weekly paper, a theatre, and an ice-factory. Directly south of it is the military post of Fort Brown, with fine barracks. Near the site of the present city during the Mexican War in 1846 the battles of Palo Alto and Resaca de la Palma were fought. At the time Gen. Taylor's army marched to the Rio Grande this place was occupied with corn-fields, but the town sprung up rapidly during the military occupation of the frontier, and was incorporated as a city in 1848. During the Civil War, Brownsville did a large business in cotton and merchandise, and near the town was fought the last battle by the Southern Confederacy. Three-fourths of the inhabitants are Mexicans, and most of the rest are of various European nationalities. In 1880 the population numbered 4938, but it has since increased to over 6000.

BROWN UNIVERSITY, in the city of Providence, in the State of Rhode Island, the oldest and most amply endowed institution of learning connected with the Baptist denomination in the United States, was founded in 1764. It owes its origin to the efforts of leading members of the Philadelphia Association, under whose auspices "Hopewell Academy" in New Jersey was at first established, in order to secure for their rapidly multiplying churches an educated ministry. The college was commenced in Warren, a coast town ten miles from Providence, but after six years it was removed to its present location. The story of its early struggles, and difficulties is told at length in the *Life, Times, and Correspondence of James Manning*, its first president. During the war of the Revolution college studies were suspended, and the building now called University Hall was used for barracks, and afterwards for a hospital, by the American and French troops. For more than forty years it was called Rhode Island College, but in 1804 it received the name of Brown University, in honor of Nicholas Brown, a leading merchant of Providence, who was its chief benefactor.

The charter, which was granted by the General Assembly of Rhode Island in February, 1764, has long been regarded as one of the best college charters in New England, securing ample privileges by its several clear and explicit provisions, and recognizing throughout the principles of civil and religious freedom. By it the corporation is made to consist of two branches—namely, that of the trustees and that of the fellows, "with distinct, separate, and respective powers." The trustees are thirty-six in number, of whom twenty-two must be Baptists or anti-Pedobaptists, five Quakers or Friends, five Episcopalians, and four Congregationalists. Since 1874 vacancies in this board have been filled from nominations made by the ballots of the alumni. The number of the fellows, including the president—who, in the language of the charter, "must always be a fellow"—is twelve, of whom eight "are for ever to be elected of the denomination called Baptists or anti-Pedobaptists, and the rest indifferently of any or all denominations." The president must "for ever be of the denomination called Baptists."

The buildings are ten in number. Of these, the oldest, University Hall, has an historic interest, having been modelled after Nassau Hall in Princeton, where President Manning and Tutor Howell, the first instructors, were graduated. The corner-stone of the foundation-walls was laid in May, 1770, by John Brown, the famous leader in the destruction of the Gaspee two years later. This venerable structure has lately been thoroughly renovated at an expense of thirty thousand dollars.

The "Grammar School," now rented to private parties and occupied, as at first, for a preparatory school, was erected in 1810, the cost having been defrayed by subscription. Hope College was erected in 1822 at the expense of Hon. Nicholas Brown, who named it after his only surviving sister, Hope Ives, wife of the late Thomas P. Ives. Manning Hall was erected in 1834, also at the expense of Mr. Brown, who named it after his revered instructor, the first president. Rhode Island Hall and the president's mansion were erected in 1840 at the expense mostly of citizens of Providence, Mr. Brown contributing $10,000. The chemical laboratory was erected in 1862 through the exertions of Hon. Nathaniel P. Hill, United States Senator from Colorado, who was then a professor in the institution. The new library building, which has been pronounced by competent judges to be one of the finest of its kind in the country, was erected in 1878, at a cost, exclusive of the lot on which it stands, of $96,000. Both building and grounds were a bequest of the late John Carter Brown, a son of the benefactor from whom the institution derives its name. The new dormitory, named Slater Hall, was erected in 1879 by Hon. Horatio N. Slater, a member of the board of fellows and a liberal benefactor of the college. Sayles Memorial Hall, which was dedicated in June, 1881, is a beautiful structure of granite and freestone.

The library contains at present 65,000 bound volumes and upwards of 15,000 unbound pamphlets, being the third college library in size and value in the country. The funds of the university, according to the latest report of the treasurer, amount to $890,860. Of this sum, $175,628 are unproductive, having been given for the erection of new buildings, etc., leaving a working capital of $715,232. There are sixty-six scholarships, of $1000 each, for the aid of indigent students, and also premium, prize, and aid funds amounting in addition to $38,762.

The first president, James Manning, died in 1791. His successors were Jonathan Maxcy, Asa Messer, Francis Wayland, Barnas Sears, and Alexis Caswell, all of whom have died. Rev. E. G. Robinson became president in 1872, and after an honorable career retired in 1889 on account of his advanced age. Rev. E. B. Andrews was called to succeed him. The faculty consists of the president, thirteen professors, two assistant professors, one instructor, and one assistant instructor. There are also a librarian, an assistant librarian, and a registrar. The present number of students is 325. The number of graduates, according to the latest triennial catalogue, is 3500. About one-fourth of these have become Christian ministers.

BRUCE, Alexander Balmain, D.D., a Scotch professor and minister of the Free Church, was born in Aberdalgie, Perthshire, in 1831. He was educated in the University of Edinburgh, and received his theological training in the Free Church College, Edinburgh, under Dr. William Cunningham. In 1859 he took his first pastoral charge in Cardross, on the north bank of the Clyde, where he remained nine years. In 1868 he was transferred to a charge in Broughty Ferry, near Dundee, and in 1875 he was appointed professor of apologetics and New-Testament exegesis in the Free Church College, Glasgow, which position he still occupies. He received the honorary degree of D. D. from the University of Glasgow in 1876. He is the author of several well-known works, the first being *The Training of the Twelve* (1871; 3d ed. 1882). The next was *The Humiliation of Christ* (1876; 2d ed. 1881). His work on *The Chief End of Revelation* (London, 1876) was the substance of a series of lectures delivered in the Presbyterian College, London, and on its appearance provoked some hostile criticism. His latest work is on *The Parabolic Teaching of Christ* (London, 1882).

BRUCH, Max, the celebrated musical composer, who was born at Cologne, Jan. 6, 1838, probably received his earliest musical promptings from his mother, who was considered a fine singer. Having studied with Breidenstein at Bonn, he gained the scholarship of the Mozart foundation at Frankfort-on-Main, which lasted from 1852 to 1856, during which period he studied with Hiller, Reinecke, and Breuning at Cologne. After visiting Leipsic, Bruch proceeded to Munich, where he was introduced to the poet Geibel, who wrote the libretto of *Loreley* for Mendelssohn. Bruch had already com-

posed music for this work, and, having obtained Geibel's consent, it was produced at Mannheim. Since 1870, Bruch has devoted himself entirely to composition, residing at Berlin and Bonn. His earliest work was an operetta, *Scherz, List, und Rache* (Goethe). Then followed some chamber music and the *Loreley* (op. 16).

The opus 23, *Scenes from the Frithjof-Saga*, set for male voices and orchestra, made the composer at once famous. The *Odysseus* was also received with great favor. The opera *Hermione* (founded on Shakespeare's *Winter's Tale*) was not so successful. In December. 1875, Bruch produced the oratorio *Arminius*, and subsequently incidental music for Schiller's *Jeanne d'Arc*. Perhaps of all these larger works the *Scenes from the Odysseus* best displays the special good qualities of the composer. He herein shows the power of being able to provide sufficient musical subject-matter as to be thoroughly interesting to each singer and orchestral performer engaged in its rendition. He treats the orchestra in the most masterly way, and contrasts its varied tones with those of men-singers alone and women-singers alone, or the different divisions of the choral body in combination and dramatic opposition. (S. A. P.)

BRUGSCH, Henry Charles (known as Brugsch Bey), a German Egyptologist, born at Berlin, Feb. 18, 1827. While yet a student, in 1848, he wrote a Latin treatise on the demotic inscriptions of Egypt, and soon attracted the favorable notice of Alexander von Humboldt, and, through him, of the king, Frederick William IV. He was sent at the government expense to study the Egyptian monuments in Europe, chiefly in Paris, London, Turin, and Leyden, and in 1853 he went for the first time to Egypt, where he joined the learned Mariette in his researches and discoveries. The reputation thus acquired led to his appointment in 1854 as special professor and curator of the Egyptian Museum at Berlin. In 1860 he was attached to the embassy of the Baron Minutoli to Persia, and travelled extensively in that country. Upon the death of the ambassador he was in charge of the mission, and at a later day he wrote an account of his travels, entitled *Journey of the Prussian Embassy to Persia* (2 vols. 1862–63). To continue his studies, he accepted in 1864 the post of Prussian consul at Cairo, from which he was recalled in 1868 to take the chair of Egyptian antiquities at the University of Göttingen. While holding this position he was invited by the viceroy of Egypt to take charge of the school of Egyptology at Cairo. It was while in this post that he was sent as commissioner to several international expositions with the rank and title of bey, so that he is usually called Brugsch Bey. He has written several works in his own department which are considered of great value. Among them the principal are—*Demotic Grammar* (1855); *New Researches concerning the Division of the Year among the Ancient Egyptians* (1856); *Egyptian Monuments* (1862–6); *History of Egypt from the Earliest Times to the Present Day* (Vol. I. 1859; 2d ed. 1875); *Geographic Inscriptions on Ancient Egyptian Monuments* (1865–6); *A Dictionary of Hieroglyphics* (1867–8); *The Exodus and the Egyptian Monuments* (1875); *New Fragments of the Codex Sinaiticus* (1875); *Thesaurus Inscriptionum Ægyptiarum* (1882), and *Religion und Mythologie der Alten Egypter* (1884). (H. C.)

BRUNSWICK, the county-seat of Glynn co., Ga., is on St. Simon's Sound, an inlet of the Atlantic Ocean, about 75 miles S. of Savannah. It is a port of entry, and the terminus of the Brunswick and Albany Railroad and the Brunswick and Macon Railroad. These roads cross a pine-forest belt 140 miles wide, which furnishes an immense quantity of yellow-pine lumber and naval stores for exportation. Brunswick has a large hotel, four churches for whites and three for colored people, and good public schools. Gen. Oglethorpe, the founder of Georgia, had a garrison here and laid out the town in 1735, and here John Wesley and George Whitefield preached under an oak which is still standing. The town had no commercial importance until 1860; the annual exports amount to $2,500,000. Population, 8403.

BRUTÉ, Simon Gabriel (1779–1839), bishop of Vincennes, Ind., was born at Rennes, France, March 20, 1779. His father was superintendent of the royal domains in Brittany. Bruté's intention was to enter the ecclesiastical state, but the French Revolution had closed the way to this career. In 1796 he began the study of medicine at Rennes, and continued it in Paris, where he graduated, taking the first prize out of eleven hundred students. Almost immediately after receiving his diploma he entered the seminary of St. Sulpice at Paris, and commenced the study of theology, Napoleon having just re-established the Church in France. He devoted himself with even more ardor to his new studies than he had bestowed upon medicine; was ordained priest in 1808, and refused the offer of an assistant chaplaincy to the emperor, with the dignity of canon of the cathedral of Rennes, to become professor of theology in the seminary. After two years in this position he joined Bishop Flaget, who was at that time in France looking for priests for the American mission, and in the summer of 1810 he sailed from Bordeaux with the bishop, arriving at Baltimore on August 10. Here he spent two years teaching philosophy at St. Mary's College. In 1812 he was sent to Emmittsburg, and labored there with great zeal and success. In Nov., 1815, he was made president of St. Mary's College, Baltimore, a position which he adorned by his virtue and learning until 1817, when he was recalled to Emmittsburg. Here he was pastor of the church, lecturer on the sacred Scriptures, and professor of theology in the ecclesiastical seminary and of natural philosophy in Mt. St. Mary's College.

M. Bruté's profound learning caused him to be often chosen theologian by different prelates in the Church's councils. The second provincial council of Baltimore met in Oct., 1833, and one of the first acts of the assembled bishops was to request the erection of a new episcopal see at Vincennes, Ind., and to recommend M. Bruté to be its first bishop. The pope having so directed, he took possession of his diocese on the 5th of November, 1824. The new see embraced the whole of Indiana and the greater part of Illinois. His episcopal palace was one small room with a little closet, the whole 12 × 25 feet, with neither garret nor cellar, and the bishop's income was $250, derived from subscriptions. In the whole diocese there was neither seminary, college, nor parish school. His first step was to open a school at Vincennes; he then commenced the visitation of his vast diocese, in which undertaking he travelled on horseback and endured every privation and discomfort. To secure money and clergymen, he made a journey to France not long after his consecration, and brought back twenty priests and seminarians, and means sufficient to establish a diocesan seminary at Vincennes, an orphan asylum, and a free school, and to complete his cathedral and build small churches throughout the diocese. Although his episcopacy lasted less than five years, he built 23 churches and 28 stations, 1 theological seminary, 1 secular col-

lege, 1 female academy, 2 free schools, founded 2 religious communities, and increased the number of priests from 3 to 24. He died June 26, 1839. (E. L. D.)

BRYANT, WILLIAM CULLEN (1794–1878), an American poet and journalist, and one of the foremost figures in the literary history of the country, was born Nov. 3, 1794, at Cummington, Hampshire co., Mass., a beautiful hilly country, fit cradle and home for a poet. The town was founded but a few years before by poor but enterprising settlers from Concord, who brought with them many of the severest tenets of the Puritans. Through his mother, Sarah Snell, an energetic and thrifty woman, he traced his ancestry to John Alden and Priscilla Mullins, whose story has been so beautifully told in the verses of another of their descendants, the poet Longfellow. His father, Dr. Peter Bryant, was a country physician, who came of a long-lived family, many of them doctors, going back to Stephen Bryant, who arrived in America in 1632. Dr. Bryant was a man of quiet and reserved temperament, a keen observer of Nature, and a lover of the classic poets of England, who himself was addicted to the making of verses, and impressed his tastes upon the minds of his children. The long winter nights of the region in which they lived were devoted to the treasures of the doctor's library, the largest of the neighborhood, and the days to attendance upon the public school and the exploration of the surrounding country. It was their habit to declaim to the woods and fields the verses they had read—an exercise in which Cullen, the second of the sons, and the more delicate and sensitive of them, took the greatest interest. He often tried his own "rude numbers" on these occasions, so that from a very early age he became a maker of verses. There are still extant a great many poems and poetical fragments which he wrote between his eighth and his sixteenth year—odes, satires, paraphrases of the Bible, and more ambitious compositions. One of them, treating of the advances of knowledge, he delivered before his school in his eleventh year, and it was published in 1807 in the county newspaper, the *Hampshire Gazette*. In his thirteenth year Dr. Bryant found him engaged in a lampoon upon President Jefferson, whose retaliatory measures against the English declaration of a continental blockade were exceedingly unpopular in New England, and he encouraged him to go on with it through several hundred lines. It was published in Boston in 1807 under title of "*The Embargo: a Satire*, by a Youth of Thirteen." The *Monthly Anthology*, then a critical authority, expressed a doubt as to the ability of a boy of thirteen to write such verses, and when, therefore, a second edition appeared in the following year (1808), including the "Spanish Revolution" and other poems, an advertisement was prefixed to it reasserting the age of the poet, "which," it said, "can be authenticated by many inhabitants of that place [Cummington]." These juvenile productions, for the most part imitations of the style of Pope, who was then immensely admired, although they showed no great poetic susceptibility, were yet evidences of a pretty decided literary faculty. They were none of them in the true vein of his genius as it afterward unfolded itself.

It had been determined, in spite of his father's limited means, to send Cullen to one of the New England colleges, and for that purpose in the years 1808 and 1809 he was put to school, first in North Brookfield, and then at Plainfield, Mass. He entered the Sophomore class at Williams College in 1810, but, becoming dissatisfied with the narrow range of study pursued there, obtained an honorable dismission at the end of the year with a view to removing to Yale College. This purpose, however, he was unable to accomplish, owing to his father's poverty, and for a while he continued his studies at home. It was at this time that one day, in the course of a ramble through the primeval forests, while comparing Blair's poem of "The Grave" with one of like tenor by Bishop Porteus, and having in mind also Henry Kirke White's "Ode to the Rosemary," his meditations framed themselves into a poem called "Thanatopsis," which, after it had been committed to paper, he put aside and seems to have forgotten altogether. He began his law studies in 1812 at Worthington with Mr. Howe, afterward judge of the court of common pleas, and completed them in Bridgewater in 1815, where he was admitted to the bar as an attorney of the common pleas. He took up his professional residence in Plainfield, Mass., where he wrote his "Lines to a Waterfowl," but he remained there only eight months, and then removed to Great Barrington, Berkshire co., where he continued to practise for the next nine years. His life in Great Barrington was one of literary rather than professional success, for it was but a short time after his arrival that he became well known as an author. His father, a State senator from Hampshire county, having accidentally discovered the "Thanatopsis" and a fragment now known as "An Inscription for the Entrance to a Wood," took them to Boston, where they were published in the *North American Review* of Sept., 1817. They produced a very decided impression, as well they might; for to "Thanatopsis," in its profound philosophy and majestic movement, belongs "the glory of the morning star that glitters in the front of day." No American poet had yet written anything equal to it in grandeur and beauty. Dr. Bryant was credited at first with the authorship of this poem, a mistake which was not corrected until brought to the attention of the author himself three or four months afterward by the editor, who wrote to him: "All the best judges say that it (the fragment) and your father's 'Thanatopsis' are the very best poetry that has been published in this country." Both father and son were solicited to become regular contributors, and in the next year (1818) the latter made his first appearance as a prose-writer. He reviewed for the periodical Brown's *Collection of American Poetry*, and in his criticism of the poets of the time dwelt upon their defects as poets, charging them with a want of self-reliance, inspiration, freedom, and simplicity. It was the coming poet clearing away the rubbish that lay in his path and dismissing to a deserved oblivion his predecessors, who were only pretenders to "the art and faculty divine."

In 1821, Mr. Bryant became a contributor to Mr. Dana's *Idle Man*, a periodical of great force but short life, for which he wrote the "Yellow Violet," "The West Wind," "A Winter Piece," "Green River," and "A Walk at Sunset"—poems which fully sustained the reputation he had won by his earlier pieces. They procured for him, doubtless, the invitation which came the same year to prepare a poem for the annual meeting of the Phi Beta Kappa Society of Harvard University. This he called "The Ages," and after it had been read before a considerable collection of the literary men of the day he was persuaded by Mr. R. H. Dana, Mr. Allston, Prof. E. T. Channing, and others to allow it to be printed. With a small number of other pieces it was published before the close of the year. but few as they were, only eight in all, they

stamped the author of them at once as the best poet that the New World had yet produced, and some of them, such as "Thanatopsis," "The Waterfowl," and "Green River," have scarcely been surpassed by his maturer efforts. The plaudits with which they were received in Boston, and particularly the praises of Gulian C. Verplanck of New York, seem to have drawn Bryant more and more to literature. A new periodical, called the *United States Literary Gazette*, having been established in Boston by Theophilus Parsons, afterward an eminent jurist, he wrote for it continuously during the years 1823–24, contributing many of his best effusions, such as "The Rivulet," "The Murdered Traveller," "Autumn Woods," "Hymn to the North Star," "Monument Mountain," "The Forest Hymn," and "June."

In 1825 the poet abandoned the legal profession, and made his way, "a literary adventurer," as he called himself, to New York, where he was introduced to Cooper, Sands, Verplanck, and other literary celebrities, and to the artists Vanderlyn, Cole, Durand, Inman, Morse, and many more. An offer of the editorship of the *New York Review*, a new monthly magazine established in 1825, which he accepted, induced him to settle with his family in the metropolis. For this periodical he wrote both in prose and verse, but the enterprise did not succeed, and his prospects were dark indeed when he was invited to a temporary place on the staff of the New York *Evening Post*, a leading daily newspaper, founded by Alexander Hamilton and conducted by William Coleman. At the same time he took part, in conjunction with Robert Sands and G. C. Verplanck, in the editorship of an illustrated annual called *The Talisman*, for which several of his best-known poems were written, among them "The Past" and "The Evening Wind." He wrote for the *Tales of the Glauber Spa*, which he edited shortly afterward, his stories of "Medfield" and "The Skeleton Cave." The death of William Coleman, proprietor of the *Evening Post*, in 1829, advanced him to the position of editor-in-chief and part proprietor of that journal, when for some years, owing to the exactions of his new duties, he abandoned the Muses. The profession of editor then was held in no great esteem, but his vast range of knowledge, his manly dignity in discussion, and his determination to make his journal an example of respectability, helped to lift the profession from the reproach of its earlier and less resolute days. He pursued a steady policy of general principles, criticised social and political changes, and helped to direct the current of national thought into the wisest and best channels. Not to be lost, however, to the literary world altogether, he resolved to make a collection of all the poems he had written up to that time. It was published in 1832 by Elam Bliss of New York, and received the most favorable judgments from competent critics, including such as Longfellow, Prescott, and

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of the *Plaindealer*, but formerly an associate on
staff of the *Evening Post*, characterized as pusillanimous. This led to a sharp correspondence between the essayist and the poet, which had no other result, however, than to increase their esteem for each other. The volume was noticed with little discrimination, but with praise, in the *Foreign Quarterly Review* and by John Wilson of *Blackwood's*, who quoted at length descriptive passages which, he said, "could only have emanated from a genius of a very high order."

Although Bryant had entered his new profession with strong Federal affinities, his reading inclined him to the doctrines of political economy which had begun to reflect their light from the other side of the Atlantic, and his sympathies and convictions soon identified him with the Democratic party. He supported Jackson in his fierce warfare upon the national bank, which so aroused the hostility of the merchants of New York that the prosperity of his journal seemed for a time extremely doubtful. The spirit with which it was conducted, however, enabled it to take a prominent place among its Democratic brethren. It supported Van Buren's administration during the hot financial contests brought on by Jackson's experiments on the currency, but it was not so strongly partisan as to be unwilling to rebuke its tendencies toward an alliance with the slaveholders of the South. Abolitionism was then beginning to excite a tempest of obloquy and antagonisms, and the *Evening Post*, though it did not formally side with the abolitionists, incurred a great deal of odium by its defence of the rights of free speech and of petition. From a brief visit to Europe which Mr. Bryant made in 1834, and during which he passed through France, Italy, and Germany, he was recalled by the illness of his assistant, Mr. Leggett, and the losing fortunes of his journal. For many years it was only by arduous and persistent struggle that it kept alive under the intense and growing prejudices of the community. But Mr. Bryant refused to surrender any of his convictions, was denounced and excommunicated by the party to which he was attached, and was more than once threatened by the violence of the mob. He opposed the annexation of Texas when that scheme was broached in 1838, and the consequent war with Mexico; he was instrumental in forming the Free-Soil party in 1848 to counteract the introduction of slavery into the new territories acquired from Mexico; and, though he continued to act at times with the Democratic party, his allegiance to it was so remittent that he found no difficulty in 1856 in taking an active and leading part in the formation of the great Republican party which has since governed the nation. He was in 1860 one of the presidential electors of Abraham Lincoln, whose confidence and friendship he enjoyed, and whose administration, during the difficult times of the Civil War, was greatly aided by Mr. Bryant's private as well as public communications. All through the war he was conspicuous as a vehement defender of the cause of the Union, an advocate of the emancipation of the slaves, of the great constitutional amendments by which universal freedom was secured, and, after the war, of such an adjustment of the relations of the States as would lead to their permanent reconciliation and harmony.

As an editor Mr. Bryant exercised a great influence. He composed slowly and with care, and, like Pope, invariably used old envelopes and scraps of waste paper, of which he economized a store. A fund of anecdote and poetical quotation gave sprightliness to his writings, and he wielded the more delicate weapons of irony and ridicule with greatest zest, though he never re-

fused a more direct engagement with his adversaries when the cause demanded it. He belonged not so much to that school of journalism which strives to make a complete record of the events of the day as to that which endeavors to act on public sentiment. The sincerity and earnestness with which he presented his principles, his quick native sense of justice, the vigor and directness and the ability of his discussions, his wonderful insight into the tendencies of measures which sometimes became prophecy, his known probity, and his independence of managing politicians, gained him respect even in quarters where his opinions were distasteful. For this reason his journal, though it never attained as wide a circulation as some others, was felt to be a power in the land, greatly dreaded by those whom it assailed, but warmly admired by those who coincided with its views of policy. No other journal was more instrumental in bringing about the great changes of opinion which ended in the destruction of slavery.

Mr. Bryant was not so much absorbed in his editorial occupation as to prevent his engaging in other literary pursuits. He possessed, without being an orator, a certain facility and grace of speech which procured him many invitations to deliver addresses on public occasions. He presided and spoke at the banquet given to Kossuth in 1851, at the Burns centennial in 1859, at the Schiller festivities in the same year, at those of Goethe in 1875, and at the inauguration of the statues to Shakespeare (1872), Scott (1872), Morse (1871), and Halleck (1874), and at many other events of the kind. Nearly all the great public institutions of New York, such as the Academy of Design, the Mercantile Library, the Metropolitan Art Museum, were furthered by his eloquence; but the most important performances of this kind were his funeral eulogies at different times upon his contemporaries and friends—Thomas Cole (1848), J. Fenimore Cooper (1852), Washington Irving (1860), Fitz-Greene Halleck (1869), and Gulian C. Verplanck (1870). They are marked by great simplicity yet fervor of style, fine characterization, agreeable reminiscences, and the utmost elegance and purity of language, and were thought of sufficient interest to justify a separate publication of them, in a volume entitled *Orations and Addresses*, in 1873.

Nor was he prevented by his arduous labors as a journalist from extensive tours of travel, not only in his own country, but in the Old World. He went to Illinois, where his mother and brothers had settled, while it was yet in a state of wilderness; several times to the South, both before and after the war; to Cuba three times, in 1849, 1852, and 1872; to Europe six times, in 1834, 1845, 1849, 1852, 1858, and 1867, embracing in one of these visits (1852) a tour to the East; and he spent a part of every summer in excursions through some of the Middle and New England States. Of these various journeys he wrote descriptive letters for his newspaper, which in 1850 were collected in a volume and published as *Letters of a Traveller*. A second series was published in 1859 as *Letters from Spain and Other Countries*, and a third, composed of *Letters from the East*, was added in 1869.

His writing of poetry seems to have been rather the amusement than the labor of his life. It was carefully done, and is for the most part serious and meditative, and to some extent even sombre, but it is not considerable in quantity, nor is any of it what may be called a *magnum opus*. He was too much engaged in actual duties to allow himself to indulge his fancies. After the edition of his poems in 1832 he published another, somewhat enlarged, in 1842, to which he added the same year *The Fountain, and Other Poems*. Three years later a fine illustrated edition of the whole was issued from the Philadelphia press, and in 1863 he sent forth *Thirty Poems*, which were subsequently incorporated in the editions of 1864 and 1873. His poems do not number in all over one hundred and fifty, most of them short, but a few of them, like "The Ages," "Sella," and "The Little People of the Snow," extending to several hundred lines. He was solicited, especially by his friend R. H. Dana, to devote his powers to some work of greater magnitude, but he invariably declined. He held the opinion elaborated by Poe in later years, that a long poem was, like a long ecstasy, impossible, and that the great works of Homer, Dante, Spenser, Tasso, and Milton were merely a succession of short poems strung together upon a thread of story. His most elaborate work was undertaken in his old age, when he was in his seventy-second year. The death of his wife in that year imposed upon him the necessity of some distraction from the sorrows of his loss, and he began a translation of the immortal poems of Homer. The *Iliad* he brought out in 1870, and the *Odyssey* in 1872. This was a prodigious effort for a man at his time of life, but it was completed "without haste and without rest," and the general opinion of the critics was that no finer rendering of the old Greek bard had ever been made in the English tongue. Mr. Bryant was at first inclined to put his verses in the hexameter form, but finding that metre impracticable, he fell back upon blank verse, which is doubtless the noblest and most flexible measure of which our language is susceptible.

Mr. Bryant's literary life may be said to divide itself into three periods: First, that of his youth and early manhood, when he gained his position as a poet of high rank which was never afterwards shaken; second, that of his middle age, when he appeared chiefly as the politician struggling daily to assert the principles of freedom in its many applications to persons and to trade, and when, in the estimation of a large number of his contemporaries, he was under a cloud of misapprehension and dislike; and third, the period of old age, when prosperity had returned to him, when his services to the best interests of society were acknowledged, and when men of all classes and parties seemed to take delight in doing him honor. The honors showered upon him came in such abundance as almost to overwhelm him. His seventieth birthday (1864) was the occasion of a public reception given by the Century Club, of which he was one of the founders, and at which all the chief poets of the nation—Emerson, Longfellow, Whittier, Lowell, Boker, Stoddard, etc.—bore testimony to their appreciation of his merits both as a literary man and a citizen, and nearly all the prominent artists—Durand, Huntington, Wittredge, Kensett, Gifford, Bierstadt, and others—united in the gift of a portfolio of pictures illustrative of his principal works. Again, on the recurrence of his eightieth birthday, a large number of citizens of all parts of the country joined in an address of congratulation to him, announcing the presentation to him, as soon as it should be completed, of a large and beautiful silver vase whose designs commemorated the incidents of his life and writings.

It was in the midst of these tokens of reverence, full of years and honors, and with every faculty preserved by a life of singular abstemiousness and care, that he was invited by the Italian residents of New York to deliver an address upon the life of the Italian patriot

Mazzini, whose statue had just been placed in Central Park. He was there exposed to the sun for some hours, which is supposed to have done some injury to his brain; for, after walking across the Park to the house of an acquaintance, he fell as he ascended the steps, and received a concussion by which he was stunned, and of which he died on the 12th of June, 1878. He was buried upon a hillside at Roslyn, his country-seat, on the northern shore of Long Island.

Bryant's position in the poetical literature of his country, like Irving's in its prose, was that of a pioneer. He was the first of our poets to achieve a lasting distinction, and, as his life was an unusually long one, he continued to exert an important influence upon the literary development of the nation. All the younger poets looked up to him as a father, and, though in the interval between his first appearance in 1821 and his later publications in 1845 and 1864 great changes had taken place in public taste, he managed to keep his hold upon the admiration of his countrymen. Keats and Shelley in England had given a form to poetic inspiration which was followed up by Tennyson, the Brownings, and more lately by Rossetti and Swinburne. In our own country Longfellow had risen with his captivating music, Emerson with his profound insight, Whittier with his Tyrtean and soul-stirring lyrics, Lowell with his varied and rich harmonies, and Poe with his weird incantations; but these did not thrust the older poet aside. They were, indeed, among his warmest admirers, and instead of supplanting him helped the public to a fresh appreciation of his merits. The reason of this permanence of possession was that Bryant ever adhered to the great primal simplicities of Nature, to those elemental feelings which are universal with mankind, and which may be forgotten for a time, but constantly recur. His poetic creed was a distinct one: he believed that the best poetry was to be found "in the vicissitudes of human life, in the emotions of the human heart, and in the relations of man to man," and that "he who can present them in combinations and lights which at once affect the mind with a deep sense of their truth and beauty is the poet;" and to this belief he remained steadfast. As a meditative poet he ranks with the highest of our language, Cowper and Wordsworth; his studies of Nature, his reflections on the great movements of life, are full of profound morality and tender pathos, while his choice of language exhibits an exquisite nicety of taste which never has been surpassed. (G.)

BUCHANAN, Robert William, an English poet, was born at Caverswell, Staffordshire, Aug. 18, 1841. He was educated at the High School and University of Glasgow, and in his twentieth year went to London to devote himself to journalism and literature. His first volume of poems, *Undertones*, appeared in 1860. It was followed by *Idyls and Legends of Inverburn* (1865) and *London Poems* (1866). Among his other poems are—*White Rose and Red* (1870); *The Book of Orme* (1870); *Napoleon Fallen, a lyrical drama* (1871); *Drama of Kings* (1871); *Master-Spirits* (1873). He has also written a tragedy, *The Witch-Finder*; *The Comedy of a Madcap Prince*, and *Sophia*, an adaptation of Fielding's *Tom Jones* (1886). Among his prose works are—*The Land of Lorne* (1871), recounting his visit to the Hebrides, and some romances—*The Shadow of the Sword* (1877); *A Child of Nature* (1881), and several of later date. He published in the *Contemporary Review* in 1871 a severe article on *The Fleshly School of Poetry*, which provoked a sharp controversy with Swinburne and others whom he had criticised. As a poet he displays great earnestness and a high sense of the poet's vocation, but his romances are superior to his poems in interest and power.

BUCHNER, Friedrich Carl Christian Ludwig, a German physician and materialist philosopher, was born at Darmstadt, March 29, 1824. He is the third son of Dr. Ernst Büchner, physician to the grand duke of Hesse-Darmstadt. After attending the schools of his native town he was sent to the University of Geissen in the spring of 1843. For a year he studied philosophy, and then at his father's desire devoted himself to medicine. In the political agitation of that time he became a contributor to the newspapers, and he also edited the *Literary Remains* of his brother George, with an introductory biography. He afterwards resumed his medical studies at Würzburg and Vienna. His articles in medical journals attracted notice from the members of his profession, and for three years he was assistant clinical professor and lecturer in Tübingen University. He still continued with remarkable activity his contributions to political as well as medical journals. His essays in the latter gradually prepared the way for his celebrated work on *Force and Matter* ("Kraft und Stoff"), first published in 1855. The authorities of the university, alarmed at its bold and arrogant materialism, deprived the writer of his professorship. He then returned to the practice of medicine. He published *Nature and Spirit* (1857), *Physiological Sketches* (1861), and *Nature and Science* (1862). In 1864, he translated into German and edited Lyell's *Antiquity of Man*, and in the same year his own work appeared in an English dress. In 1868 he published some lectures on Darwin's theory, which have since been revised and enlarged. Further results of his investigations and reflections on these subjects were given to the world in 1869 in his work on *The Place of Man in Nature, Past, Present, and Future*. In 1872, Dr. Büchner visited the United States, and travelled through thirty-two States, lecturing in German on scientific and philosophic subjects. Some of these lectures were at once published in English under the title *Materialism, its History and Influence on Society* (New York, 1873). A later work, *Aus dem Geistesleben der Thieren* (1877), was translated into English as *Mind in Animals* (London, 1880), and has also appeared in French and Dutch. His latest works are *Liebe und Liebesleben in der Thierwelt* (1879), *Licht und Leben* (1882), and *Die Macht der Vererbung* (1882). Since its publication in 1855 *Kraft und Stoff* has been translated into English, Danish, French, Dutch, Italian, Spanish, Swedish, Polish, Hungarian, Roumanian, Modern Greek, and Armenian, and its author is regarded as the foremost champion of materialism. Several replies to his work have appeared, the ablest of which is perhaps that of M. Paul Janet, professor at the Sorbonne: *Le Matérialisme contemporain en Allemagne* (1864).

BUCKNER, Simon Bolivar, a lieutenant-general in the Confederate army, was born in Hart co., Ky., April 1, 1823. He entered West Point in 1840, and was appointed second lieutenant in the Second infantry. In 1845 he was appointed instructor of ethics at West Point, but in May, 1846, was ordered to Mexico, where he served with distinction. At the close of the war he was appointed assistant instructor of infantry tactics at West Point; afterwards he served on the Plains, and in New York as captain of the subsistence department. In 1855 he resigned his commission and settled at Louisville. In 1860 he took part in reorganizing the

militia of Kentucky into a State guard, and was appointed its commander-in-chief. Gen. Buckner was opposed to the war, and endeavored to secure the neutrality of Kentucky, but finding this could not be done, he joined the Southern Confederacy in August, 1861. He was appointed a brigadier-general Sept. 16, and occupied Bowling Green, Ky., with 5000 men. When Fort Donelson was attacked in February, 1862, he was third in command, but his superior officers having escaped, he surrendered the fort Feb. 16. He was afterwards kept four months in solitary confinement in Fort Warren, Boston harbor. In August, 1862, he was exchanged and made a major-general, with a division command at Chattanooga. He took part in Bragg's Kentucky campaign, and at its close was assigned to the command of the department of the Gulf, with his headquarters at Mobile. From the defence of this city he was called to Knoxville, Tenn., to command the department of East Tennessee. He joined Bragg's army in time to take part in the battle of Chickamauga. In 1864 he was assigned to a command in the army of Gen E. Kirby Smith, and afterwards appointed to the command of the district of Louisiana and made a lieutenant-general, but he was not much engaged in active service after this time. On May 26, 1865, a convention for the surrender of the Army of the Trans-Mississippi was arranged between Gens. Buckner and Price on the part of the Confederates, and Major-general Canby. Gen. Buckner settled in New Orleans, becoming president of an insurance company. When financial reverses fell on Gen Grant he offered assistance, and in 1885 was one of his pall-bearers. He was elected governor of Kentucky in 1887.

BUCYRUS, the county-seat of Crawford co., Ohio, is on the Sandusky River, 12 miles W. of Crestline, and at the intersection of the Pittsburg, Fort Wayne, and Chicago Railroad with the Ohio Central Railroad. The central offices, supply-dépôt, and car-works of the latter road are in this place. It has a court-house, two banks, three weekly newspapers (one German), nine churches, a large public school-house, and is free of debt. It has two foundries, four saw-mills, two planing-mills, three flour-mills, a tannery, and manufactories of hosiery, knitting-machines, copper kettles, ploughs, farming implements, bent wood, and carriages. Here the skeleton of a mastodon was found in 1838. Population, 5936.

BUELL, Don Carlos, an American general, was born near Marietta, Ohio, March 23, 1818. He graduated at West Point in 1841, and served in the Florida War and on frontier duty till 1845. He took part in the Mexican War as captain of infantry under both Gens. Taylor and Scott, and was severely wounded at Churubusco, Aug. 19, 1847. He was afterwards employed in the adjutant-general's office at Washington, and as assistant adjutant-general in various parts of the country. At the commencement of the Civil War in 1861 he assisted in organizing the troops collected at Washington, and in November was placed in command of the Department of the Ohio with headquarters at Louisville, Ky. He was appointed major-general of volunteers March 21, 1862, and his department united with that of the Mississippi under Maj.-Gen. Halleck. He set out to join Gen. Grant in the movement along the Tennessee River, and with one of his divisions reached the battlefield of Shiloh on the evening of April 6, when Grant had been driven back to the river by the Confederates under Gen. Albert S. Johnston, who was killed in the fight. When the rest of Buell's troops came up the next day, the Confederates, now under Gen. Beauregard, were driven back to Corinth, Miss. In June, Gen. Buell established his headquarters at Huntsville, Ala., but in July, Gen. Bragg, who had succeeded Beauregard, marched into Kentucky with 45,000 men, captured Frankfort, and threatened Louisville. Buell, leaving Nashville strongly fortified and well garrisoned, marched northward with an army larger than Bragg's, but chiefly composed of fresh recruits. Gen. Halleck at this time wished to remove Gen. Buell from command, and offered the position to Gen. G. H. Thomas, but the latter declined it under the circumstances, and urged Buell's retention. Distrusting the efficiency of his own army, Buell followed Bragg closely, determined not to fight, but to force him out of the State. Part of his army, however, under Gen. A. M. McCook, fought part of the Confederates at Perryville, Oct. 8, and through want of co-operation on the part of the other corps commanders suffered defeat. A court-martial was held, and Buell was acquitted, but Andrew Johnson, then military governor of Tennessee, protested against his returning to duty in that State. He was therefore transferred to the command of the Department of the Gulf, but declined, and resigned June 1, 1864, and subsequently held the office of pension agent at Louisville, Ky. He became president of the Green River Iron-works in 1865.

BUENA VISTA. See Mexican War.

BUENA VISTA, a city of Chaffee co., Col., is near the confluence of Cottonwood Creek with the Arkansas River, and at the junction of the Denver and Rio Grande Railroad with the Denver and South Park Railroad. It has a fine court-house, an opera-house, three churches, a fine school-house, three weekly newspapers, and a good fire department. Being close to some of the richest silver-mines in Colorado, its chief industry is mining, and it contains works for sampling, concentrating, and reducing the ores; 300,000 bushels of charcoal are burnt monthly in this vicinity for smelting purposes. The Arkansas Valley is here 7 miles wide. Population, 2141.

BUFFALO. See Bison.

BUFFALO, the county-seat of Erie co., N. Y., is the third city in population in the State and the thirteenth in the United States. It is at the lower end of Lake Erie and at the head of Niagara River, in 42° 53′ N. lat. and 78° 55′ W. long. Its distance from Chicago is 539 miles; from Cleveland, 183 miles; from New York City, 423 miles by the Lake Erie and Western Railroad, while it is somewhat greater by the New York Central and Hudson River Railroad, and less by the New York, Lackawanna, and Western Railroad. The first of these roads has branches to Niagara Falls on the north and to Jamestown on the south. The second road has branches to Niagara Falls and Lockport. The Buffalo, New York, and Philadelphia Railroad taps the oil and coal regions of Pennsylvania. Connection is also made at Lewiston with the Niagara Falls branch of the Rome, Watertown, and Oswego Railroad for all points on the southern shore of Lake Ontario. Buffalo is also the western terminus of the newly-built (1883) West Shore Railroad, and the eastern terminus of the Lake Shore and Michigan Southern Railroad; the Canada Southern Railroad; the "Loop Line" of the Great Western Railroad of Canada; the Buffalo and Lake Huron branch of the Grand Trunk Railway of Canada; the Buffalo, New York, and Erie Railroad; the Buffalo Creek Railroad; and the new line to Chicago known

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as the "Nickel Plate," or the New York, Chicago, and St. Louis Railroad. This large increase in railroad facilities has thrown Buffalo's marine commerce into the shade by comparison only. The opening of the Erie Canal in 1825 was the beginning of its commercial prosperity, as is shown by the history of the Board of Trade. The harbor is, next to that of Erie in Pennsylvania, the finest on Lake Erie. The Buffalo River, which has been made navigable for over a mile, is protected on either bank by extensive breakwaters at the point where it empties into the lake. An outer breakwater 4000 feet long protects the mouth of the river at a distance of half a mile, while the whole harbor is guarded by Fort Porter. By these means and by constant dredging the harbor readily allows the entrance of vessels of 17 feet draught as against 13 feet draught in 1853. The business of elevating, transferring, and storing grain is carried on by 22 elevators, with a storage capacity of from 100,000 to 1,200,000 bushels; 7 transports, with from 40,000 to 60,000 bushels storage capacity; and 6 floaters. The majority of these elevators, etc., are controlled by an elevator association. The navigation on Lake Erie, as is shown by the records since 1827, usually opens about the middle of April, though it has opened as early as March 14, and again has been delayed as late as the middle of May. The healthfulness of Buffalo is shown by its death-rate being but 14 per 1000 yearly, and the average mean temperature standing at 48°. The leading articles manufactured in Buffalo are—ale, boats and lake vessels, boilers, boots and shoes, boxes, bridges, carpets, carriages, castings, cigars, flour, furniture, glucose, oils, organs, paper, pianos, scales, soaps, and mill furnishing. Aside from these there are extensive forges and iron-works of various kinds. The lumber trade is largely increasing. For municipal purposes the city is divided into thirteen wards, each of which sends two aldermen to the board. There is also a board of health, and there are water, police, and fire commissioners. The water-works are owned by the city. Fifteen steam-engines, five chemical engines, three hook-and-ladder trucks, and one hose-cart constitute the protection against fire as administered by a paid fire department. Law and order are preserved by an efficient police force. The State also has an arsenal here. There are forty-one hotels, four large markets, and twenty-one cemeteries, most of which are of limited size. Three national banks, eight State and other banks, five savings banks, and four private bankers attend to the monetary wants of the city. The religious wants are supplied by the following churches: Baptist, 11; Catholic, 22; Episcopal, 12; Jewish, 4; Lutheran, German Evangelical, etc., 21; Friends, 1; Methodist, 15; Presbyterian, 12; Unitarian, 1; Universalist, 1; Congregational, 1; total, 101. Newspapers and periodicals are issued as follows: daily, 8; weekly, 21; monthly, 6. There are six libraries, the larger of which are those of the Young Men's Association (41,000 vols.) and the Grosvenor free (25,000 vols.). The public-school system comprises a central high school and thirty-seven public schools, with a total force of 454 teachers. There are also a State normal school, a female academy, and several undenominational schools, either private or belonging to orphan asylums or other endowments. The Roman Catholics have twenty-two parochial schools, two colleges, and seven convents. Aside from the Society of Natural Sciences and the Historical Society, there are the Fine Arts , the Mechanics' Institute, and the Catholic Institute. In practical charities Buffalo is not surpassed by any city of its size. Besides the State asylum for the insane, it contains the Providence lunatic asylum, St. Mary's institute for deaf-mutes, a city dispensary, an eye-and-ear infirmary, and the following hospitals: General, Homœopathic, Sisters of Charity, St. Francis, and Small-Pox. Buffalo is a port of entry, and at its custom-house large revenues are paid to the U. S. Government from the "District of Buffalo Creek."

Buffalo was founded in 1801 by the Holland Land Company, which bought all the tract west of the Genesee in the State of New York. The whole of this tract was erected into a county called Genesee, with the county-seat at Batavia. In 1821, Erie county was formed, with its county-seat at Buffalo, formerly known as Buffalo Creek and New Amsterdam. As a compensation for its loss by fire at the hands of the British, Dec. 31, 1813, Congress afterwards voted an appropriation of $80,000, which was a great stimulus to the village. It became a city in 1832, and its growth has been very marked from that date to the present. The village of Black Rock was annexed in 1853. The population has increased as follows, according to the U. S. census: 1810, 1508; 1820, 2095; 1830, 8653; 1840, 18,213; 1850, 42,261; 1860, 81,129; 1870, 117,714; 1880, 155,137; 1890. 254,457.

BUGGE, Elseus Sophus, a Norwegian linguist, was born Jan. 5, 1833, in Laurvig. He studied at the University of Christiania, and when only seventeen years old wrote his first literary work, *On the Permutation of Consonants in the Speech of the Norse People* (1850), which was followed by a series of similar productions. In 1858 appeared his edition of *Old Norse Folk-Songs*, a standard work in Norse ballad literature. From 1858 to 1864 he studied in Copenhagen and in Berlin, supported by his own Government, and on his return to Norway the Storthing created for him a chair of comparative philology and Old Norse. In 1864 and 1865 appeared his scholarly editions of the *Volsunga* and *Hervarar-saga*. His most important work is his splendid edition of the *Elder Edda* in the original text (1867), a work which supersedes all previous editions. Of scarcely less importance are his articles on runes, which he published in the *Tidsskrift fer Philologi og Pædagogik* and in the *Aarböger*, and especially his epoch-making *Interpretation of Runic Inscriptions from Rökstenen in East Gothland*, published in the Swedish *Antikvarisk Tidsskrift*, vol. v. In 1867 he edited *Plautus*, and in 1878 he published his *Old Italian Studies*. He has also written several articles on Romance etymology in the Paris *Roumania*, supplying many gaps in the works of Diez, Littré, and others. During the past two years he has been occupied with his studies on the *Origin of the Norse Mythologic and Heroic Saga*, of which two parts have appeared. He traces a large part of the old Eddaic stories to comparatively late sources and to Greek or Roman originals. He does not, however, seem able to sustain this theory. (R. B. A.)

BUILDING ASSOCIATIONS. In so far as the title "building associations" pretends to be descriptive of the character of the societies which in Pennsylvania are called by that name, it is a misnomer. It is simply indicative of a result that has followed fr organizations—namely, the extension of build operations. In Massachusetts they are known and y be defined as co-operative saving-fund and loan so

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On the 3d of January, 1831, the first association organized in this country was begun, under the name of the Oxford Provident Building Association, at Frankford, a suburb of Philadelphia. It was started as a philanthropic measure. Some of the originators were acquainted with the principles of co-operative societies in Great Britain, and obtained their ideas of building associations from that country. From the Oxford Provident thousands of associations have sprung up in all sections of the United States, and special legislation in many of the States has been called into being to meet their wants and requirements.

The associations are organized on the basis of a capital stock divided into shares of an equal fixed amount. In Pennsylvania the par value of each share is $200. In some of the States a maximum capital stock is fixed by law, and a limit is placed upon the number of shares that any one member may hold. Membership is obtained by subscription to one or more of the shares. No form of proposition, initiation, or balloting is required. When once organized the whole end and object of the association is to make each share subscribed for worth in actual cash or an equivalent its par value. All other results that may be accomplished are incidental and secondary. The true object is to accumulate assets sufficient to distribute to each member the par value of the shares for which he has subscribed. It is evident that this end might be attained at once were each member to pay into the treasury the par value of the shares for which he has subscribed, or it might be attained in time by regular payments made on account and hoarded in a common treasury. Such methods of payment would, however, be in direct opposition to the principles of the associations, one of which is to make money by the judicious investment of money. Payments are made on account of each share in regular periodical instalments of a certain fixed amount. The time when these are made is called the meeting-night. In Pennsylvania the meeting-night is once a month, and an instalment of $1 on each share is then due and payable. In this manner the associations combine all the advantages of saving-fund societies, and at the same time it is compulsory on the depositor to deposit, for a small fine is imposed upon every default in the regular payment of instalments. If a member be in default for a certain time fixed by the by-laws, he ceases to be a member, and if he be a non-borrower he is entitled to receive the withdrawal value of his shares, less the dues and fines he may owe to the association. If he be a borrower, the amount of his indebtedness to the association is realized from the securities he has given for the fulfilment of his obligations as a borrower, and the balance, if any, placed to his credit. If the payments made by stockholders were simply to be hoarded, the shares in Pennsylvania associations would be worth their par value in exactly 200 months. The theory of the associations is, however, that the par value will be reached, or, in common parlance, the association will be at an end, in about half of that time. It has not been a rare thing for associations to expire in from nine to ten years. The method by which the shares thus attain their par value in so short a time is one of the distinctive features of building associations. The stockholders are divided into two classes—namely, borrowers and non-borrowers; any member may belong to either or both of these classes. No one who is not a member is permitted to borrow. The duties of the non-borrower are very simple, consisting chiefly in the regular payment of the instalments upon the shares which he owns. In addition to these, the borrower has other payments to make. Borrowing is made upon shares, and is, in effect, an anticipated realization by the borrower of the par value of the shares borrowed upon before they are actually worth their par value. For instance: 200 members form an association, each subscribing for one share of stock of the par value of $200. When the first monthly instalment is paid in, there will be $200 in the treasury; in other words, the par value of one share. Instead of waiting for every one of the shares to become worth its par value, any member may anticipate this result and borrow from the treasury the par value of his share—namely, the $200. The treasury will then be empty. For the privilege of thus anticipating the borrower pays what is usually called a "premium," which is a sum either deducted from the loan before the borrower receives it or paid by him in instalments. The amount of the premium is determined by the highest offer or bid made by any member at the meeting when the specific loan is awarded. In addition to the premium the borrower pays interest at the rate, in Pennsylvania, of 6 per cent. per annum. The interest is paid in monthly instalments. To guard the society against loss, the borrower gives security for the regular payment of the instalments on the shares borrowed upon, the interest on the loan, and, where the premium is paid in instalments, the regular payment of the instalments. The shares borrowed upon are also assigned as collateral to the association. The security generally offered is either real estate or stock of the association. The former is usually in the shape of a mortgage, while the latter is, in substance, simply an assignment to the association of shares of stock sufficient in actual paid-up value to secure the society against loss. Any marketable security may be offered, and, unless the by-laws prohibit, may, in the discretion of the directors, be received. When the association has attained its object in making all the shares worth in money or its equivalent their par value, the securities are returned to the borrower and his debt is cancelled. The non-borrower of course receives the cash par value of his shares, but the borrower, having already realized the par value, receives only a cancellation of his debt.

This, in brief, is a general description of building associations. But, although there is one genus, there are several species, characterized by different methods of charging premiums. In the old Philadelphia societies the method of borrowing was by a percentage on the sum loaned, and deducted at once from the amount given to the borrower. For instance, if the highest premium offered should be 30 per cent. and the successful bidder be awarded a loan upon one share, he would receive $200 less 30 per cent., or $140. The $60 he pays for the privilege of anticipating the par value of the share. In many societies the borrower pays interest on the par value of the shares borrowed upon, even though the premium is deducted as above mentioned, while in other societies interest is paid only on the sum actually received by him. Some associations require the borrower to pay the premium bid in monthly instalments. There is a third class, called "interest-in-advance associations," in which the premium offered is in the shape of interest. The bidder offers interest for so many months, and he who offers for the longest term is awarded the loan. A minimum number of months is fixed by the by-laws below which no bid will be received. The interest that the bidder offers is then deducted at once from the loan, and until the period for which he has bid expires he simply pays into the

society his regular instalment-dues upon the shares on which he has borrowed. Should the association not end at or before the expiration of the number of months for which he has bid interest, he is charged regular interest thereafter during the continuance of the association. Provision is made in all associations for withdrawing members and borrowers desirous of paying off loans before they are due. In the former case the withdrawing member receives not the actual value of his shares, but, in addition to the payments he has made, a certain proportion of the profits or a certain rate of interest, as determined by the by-laws. In the latter, the borrower receives back a certain portion of the premium he has paid, the amount of which decreases with the number of years during which he has had the use of his loan.

It was said in the beginning of this article that it was not unusual for associations to expire in from nine to ten years. A difficulty was early met with, however, in lending money during the last few years of the existence of the society. Borrowers who desired loans for short periods were few, and although the amount of premium became less as the society increased in age, yet this advantage was set off by the fact that all loans matured at the expiration of the association. Another difficulty was experienced in obtaining new members. Every month the shares of course increased in value, and the purchase of one became more difficult. A new member was obliged to place himself on the same plane with those who had been members from the beginning of the association. To overcome these and other difficulties, serial or permanent associations were introduced, and are now almost the only ones in existence. In these the stock is issued in series, and each series is in effect a new association. In many societies new series or new issues of stock are made every year, while in others they are made as the exigency requires. The funds received from all the series are thrown into a common treasury, and loaned out to the highest bidder in whatever series he may be. Accounts are kept with each series, and the profits adjusted among them.

In Massachusetts a law requires each association to set aside a certain percentage of receipts to provide for the exigency of a series expiring. This wise provision should be generally adopted.

In the United States there are altogether about 4000 building associations, having 872,000 members, of whom 272,000 are borrowers. The total assets are estimated at $336,485,080, and the annual receipts $139,323,950, of which $70,512,200 are regarded as profits. Pennsylvania still leads in number, having fully 1000. Ohio has 600; Illinois, 450, of which about 300 are in Chicago; New York, 300; Missouri has 200; New Jersey, upwards of 150; Minnesota, 120; Iowa, 100, and Massachusetts, 66.

BULGARIA. Like the other *vilayets* of European Turkey which contained any considerable proportion of Christian inhabitants, Bulgaria suffered for more than four centuries the most cruel oppression at the hands of the Turks. The Bulgarians, owing, perhaps, to their composite ancestry of Finnish and Slavic races, were a more patient and long-suffering people than the more purely Slavic Bosniacs and Servians, but their wrath, when once aroused, was the more terrible. The oppression of the Turkish landlords and officials, and of the tax-farmers, grew more and more intolerable :h every year of the present century, and led to uent insurrections, which were put down with excessive cruelty and bloodshed. In 1827, in 1848, in 1862, and in 1870 there were uprisings of the Bulgarians against the oppression of their masters, and many Bulgarians lost their lives.

See Vol. IV. p. 462 Am. ed. (p. 516 Edin. ed.).

The Bulgarian Church, founded in the ninth century, had always claimed independence of the Orthodox Greek Church, though similar to it in doctrines and forms. The Bulgarians cling to it with the most intense devotion they hailed, therefore, with the utmost joy the re-establishment of that Church under a Bulgarian exarch, bishops, and clergy in Feb., 1872. A small proportion of the Bulgarians had, indeed, been forcibly converted to Mohammedanism in the fifteenth century, and their descendants, called Pomaks, were still Mohammedans, but these were mostly in sympathy with the Christian Bulgarians: their worst enemies were the Osmanli Turks, Tatars, and Circassians, all fanatical Mohammedans, who constituted about one-third of the population. After the uprising in Bosnia in 1875 the Bulgarians, who had petitioned for years for the redress of their grievances without obtaining any relief, were disposed to rise also. They demanded—(1) that the country should be governed by Christian instead of Turkish officials, since more than two-thirds of the population were Christians; (2) that the Bulgarian language should be recognized as official, or at least that all documents in Turkish should be accompanied by a Bulgarian translation; (3) that the taxes should be collected honestly and justly, and without distraint or extortion, and that the tax-gatherers should not be allowed to quarter themselves upon the rayahs or farmers; (4) that the Bulgarian and Turk should be equal before the law, and the wrongs of the one should be righted as fully and promptly as those of the other; (5) that the honor of their women and girls should be protected, and that they should no longer be the prey of the Turks; (6) that the Christians should be allowed to enter the military service on the same terms as the Mohammedans, and should no longer be subjected to the odious exemption tax. All these demands had been repeatedly granted—on paper. In the autumn of 1875, the Bulgarian committee at Bucharest, composed of Bulgarian exiles and some Russian emissaries, advised the formation of committees in the larger towns to press these demands more urgently. There was no intention of actual insurrection at this time, but the movement only aggravated the difficulty. It led to the affair of Eski Zagra, in which a considerable number of innocent Bulgarians lost their lives.

There were no further attempts at insurrection until May, 1876, when the younger and more restless of the Bulgarians, who had been petitioning the sultan through the winter for the redress of their grievances without success, began to talk of rising and procuring by force the rights which were so persistently refused. They were prompted to this course by several considerations: Bosnia had risen in such force as to obtain, in part at least, the relief which she sought; Servia, though still delaying, was about to proclaim war against Turkey, and the opportunity was thought to be a favorable one for Bulgaria; the revolutionary committee at Bucharest, composed of Bulgarian exiles, Roumanian adventurers, and Russian emissaries, and wholly under Russian control, was sending its agents into Bulgaria to stir up an insurrection. This committee seems to have aimed at exciting the Turks to acts of violence, so as to give the Russian Government a better pretext for engaging in war with Turkey.

The Bulgarians had no leaders, no organization, no

arms. The committee sent some young men of no capacity or military education to become local leaders, and raised about $10,000 from the Bulgarians to purchase arms, every dollar of which was wasted. The unarmed insurgents were led against villages of no great importance, of which they took possession without resistance, and threw up some slight intrenchments. In a few instances they killed Turkish officials who resisted them, but when regular troops were sent against them they either fled or surrendered. A few months later Mr. Eugene Schuyler, then American secretary of legation at Constantinople, made a searching examination of this insurrection, and reported that only fifteen villages were thus seized and only 115 persons slain in all, most of them in fight. There was no burning of villages and very little plundering, no murders of women and children, and no violation of women or girls.

In suppressing this insignificant insurrection the Turkish authorities were guilty of atrocities which have no parallel in modern times. What they did is graphically told in the reports of Mr. Schuyler, Mr. J. A. MacGahan, and Mr. Walter Baring, each of whom visited the scenes of the massacres. In the sandjaks or provinces of Philippopolis, Slivno, and Tirnova, and the neighboring part of the province of Sophia, seventy-nine villages and towns, many of them of from 5000 to 10,000 inhabitants, were wholly or partially burned, and very many others pillaged. At least 9000 houses were burned, and 72,000 persons left without shelter. Property worth more than $50,000,000 was either destroyed or carried away; 15,000 persons were killed, and many were thrust into loathsome prisons, where they died from starvation. Two-thirds of the slain were women and children.

The deposition and subsequent death of the sultan in June, 1876, and the deposition of his successor, Murad V., on the 31st of August, did not modify the policy of the Ottoman Government.

The atrocities in Bulgaria and elsewhere had roused the indignation of all Europe. Yet strenuous efforts were made by some of the powers to prevent war on the part of Russia, and to extort from Turkey such concessions to its Christian population, and such measures of reform, as might avert the impending danger. A conference of the great powers was held in Constantinople in December, 1876, and the strongest pressure was brought to bear upon the Porte; but all in vain. Controlled as it was by the most fanatical Mohammedans, it could not recede from any of its previous actions, nor would it give any pledges of a less violent and cruel course in the future. A protocol prepared by Russia, and signed by the representatives of the six powers at London, March 31, 1877, proved equally ineffective, though its demands were very moderate. There remained, then, nothing but war, which was declared by the czar against Turkey on the 24th of April (N. S.). The history of this Russo-Turkish War concerns this article only in the fact that all the important battles of that war in European Turkey were fought on Bulgarian soil. The war virtually closed with the armistice of Jan. 25, 1878, though the Treaty of San Stefano was not signed till March 3, 1878. During its continuance of nine months there were severe battles at Rustchuk on the Danube, Nikopol, Yeni-Sagra, at the Shipka Pass (three or four conflicts), Kara Hassanksi, Lovatz, Kacelyo, Kadikoi, Provitz, Etropol, Kamarli, Ak-Kalanka, and Pirot, besides the capture, recapture, and protracted siege of Plevna.

At the congress of the great powers to determine the results of the war, which met in Berlin June 13, 1878, the condition of the vilayets of European Turkey was considered, as well as that of the neighboring principalities which had previously been tributary to Turkey. By Article I. of the treaty made and ratified by this congress it was ordered that "Bulgaria should be constituted an autonomous and tributary principality, under the suzerainty of His Imperial Majesty the sultan. It will have a Christian government and a national militia." Article III. ordered, "The prince of Bulgaria shall be freely elected by the population and confirmed by the Sublime Porte, with the consent of the powers. No member of any of the reigning houses of the great European powers can be elected prince of Bulgaria. In case of a vacancy in the princely dignity the election of the new prince shall take place under the same conditions and with the same forms."

By the constitution of 1879 the legislative authority is vested in a single chamber, called the "National Assembly of Bulgaria." The members of it are elected by universal manhood suffrage, at the rating of one member to every 20,000 of the population, counting both sexes. The prince has the right of nominating, in addition, a number of deputies equal to half the number returned by the popular vote. The time of duration of the assembly is four years, but it may be dissolved at any time by the prince, when new elections must take place within four months. The executive power is vested, under the prince, in a council of seven ministers, viz.: for foreign affairs and public worship, of the interior, of public instruction, of finance, of public works and agriculture, of justice, and of war. The amount of the annual tribute which the principality of Bulgaria should pay to the suzerain court (of Turkey) was to be fixed by an agreement between the powers signatory of the treaty at the close of the first year of the working of the new organization. It was also provided that these signatories should calculate this tribute on the mean revenue of the territory of the principality, and that they should take into consideration what proportion of the debt of Turkey should be assumed by Bulgaria.

Area and Population.—Bulgaria, under the Turkish rule, was of uncertain bounds. The new principality whose boundaries were fixed by the Treaty of Berlin has the Danube on the north, the Black Sea (in part) on the east, the Balkans on the south, and Servia on the west. Its area is estimated at 24,360 square miles. In 1885 an important addition was made to this area. In September of that year Eastern Roumelia revolted from Turkish dominion, by a bloodless revolution, and joined Bulgaria, the union being proclaimed Sept. 15, 1885. This union has not yet been legalized by the powers, Russia opposing, yet it has been permitted to continue, and the two countries are now virtually one. By this addition the area of Bulgaria has been increased to 38,562 square miles, and the joint population is 3,154,090. A war with Servia followed this union. The latter country, jealous of this acquisition, and claiming that Bulgaria had disturbed the equilibrium of the Balkan States, invaded Bulgaria on Nov. 14th, King Milan, at the head of the Servian army, anticipating an easy march to Sofia, the Bulgarian capital. A fourteen days' war succeeded, in which Prince Alexander defeated the Servians at Slivnitza, drove them back, entered their territory, and captured Pirot. At this point Austrian intervention stopped further operations, an armistice was arranged, and peace was declared March 1, 1886.

On April 29, 1879, the Bulgarian National Assembly elected for prince, Alexander, son of Prince Alexander

of Hesse. This prince, recognised by the powers, and subsequently recognised by the Porte as governor-general of Eastern Roumelia, was highly esteemed by the people, but gradually fell into disfavor with Russia, and intrigues for his removal were instituted. In April, 1886, he was kidnapped by Russian partisans and carried into Russia. Returning immediately, he was enthusiastically received, but the hostility of Russia became so declared that he felt compelled to abdicate, which he did Nov. 10, 1886. On July 7, 1887, Prince Ferdinand, of Saxe-Coburg, was elected sovereign. To this the great powers, and particularly Russia, objected, but he accepted the throne without waiting for their consent, and still fills it acceptably to the people, though as yet not authorized by the powers. The present capital of the principality is the city of Sofia, population 32,452.

Industries, Exports and Imports.—The Bulgarians are almost entirely farmers and herdsmen. The soil is very fertile, and admirably adapted to the culture of wheat, fruits, etc. The mountainous districts afford excellent pasturage, and there are immense flocks of sheep and goats and very large herds of cattle. The principal exports, aside from grain, are wool, tallow, butter, cheese, hides, flax, silk, and timber. Silk-culture is somewhat extensive. The manufactures of Bulgaria, being of the simpler sort, are consumed at home. There are deposits of coal, which have hitherto been neglected, but which are now worked to some small extent in connection with valuable ores of iron. The imports are mostly of iron, coal, textiles, and other manufactured goods.

Financial Condition.—In 1889 the estimated revenue was $15,700,000; expenditure, $12,500,000. The total value of exports in 1888 was $12,705,000; of imports, $13,200,000. The standing army numbers 29,473, and there is a large reserve. The total length of railway in 1889 was 432 miles; telegraph, 1734 miles.

Education is at very low ebb, but is improving, under the resolute efforts of the best citizens to make the Bulgarian language the official and common language of the nation. Schools of all grades are multiplying, and there is already a Bulgarian literature, though as yet of only moderate extent. The Bulgarian language belongs to the Slavic group of tongues, but it has been corrupted by the introduction of many Turkish, Tartar, and Greek words. In its written form it is intelligible to the other Slavic nationalities.

For further information the reader may consult Cyprien Robert, *The Slave Provinces of Turkey;* Mackenzie and Irby, *Travels in the Slavonic Provinces of Turkey in Europe, 1862-75;* W. Forsyth, LL.D., *The Slavonic Provinces South of the Danube,* 1876; Malcolm Maccoll, in *Contemp. Review,* 1876, "The Christian Subjects of the Porte;" Jireček, *Geschichte der Bulgaren* (1876); Hilferding, *Serben und Bulgaren* (1874); E. S. Clark, *Races of European Turkey* (1878); Brockett, *The Bogomils of Bulgaria and Bosnia* (1879).

(L. P. B.)

BULL, Ole Bornemann, an eminent Norwegian violinist, was born at Bergen, Feb. 5, 1810. He studied under Spohr at Cassel in 1829, but received so little encouragement that he began the study of law in the University of Göttingen. In consequence of a duel he fled to Paris, and there was meditating suicide by drowning in the Seine when a lady of rank, noting in his features a resemblance to those of her deceased son, gave him the means to appear in concerts and assisted him in gaining friends. In seven years Ole Bull had gained a fortune by his performances. He visited America in 1843, and remained two years, and then tried to establish schools of art and literature in Norway, but had difficulties with the Government. He then purchased 120,000 acres in Potter co., Pa., to found a Scandinavian colony of the name of "Oleona," but here he lost his fortune and was obliged to abandon the undertaking. After other reverses he recommenced giving concerts in Europe and America, and was again successful. In 1870 he married a German lady in Wisconsin.

His violin-playing was most brilliant and attractive, and of the character best adapted to please large concert audiences rather than small coteries of students of art. Airs with variations formed the principal pieces in his programmes, and therefore the music is more like that of De Beriot than that chosen by Joachim. But, although not classical, it has afforded great pleasure to multitudes not inclined to regard music reflectively and seriously, but simply to enjoy it. He died Aug. 18, 1880. His *Life*, written by his wife, appeared in 1882.

BULLFINCH, a bird of the family *Fringillidæ*, the *Loxia pyrrhula*, L., now the *Pyrrhula vulgaris* of naturalists. There are several other species of the genus *Pyrrhula*, formerly supposed to be confined to the Old World; but a true bullfinch (*P. Cassini*, Baird) has been ascertained to occur in Alaska. The birds of this genus have an extremely thick and short bill, turgid in all its outlines; the crown, wings, and tail mostly black; the upper parts gray, with white rump; the male with most of the under parts crimson or red of some shade. The

See Vol. IV. p. 463 Am. ed. (p. 518 Edin. ed.).

Bullfinch (*Pyrrhula Cassini*).

common bullfinch is easily tamed, and may be taught to sing a variety of tunes. When caged it is subject to a kind of melanism. It nests in thickets, building a nest of twigs and rootlets, and lays four or five pale-bluish, speckled eggs. (E. C.)

BULL RUN, a small stream in North-eastern Virginia, forming the boundary between Fairfax and Prince William counties until it enters the Occoquan River about 14 miles from where that stream empties into the Potomac. Bull Run has given its name to two battles fought during the Civil War—one on July 21, 1861, and the other on August 29 and 30, 1862. The Confederates called them the first and second battles of Manassas.

The former was the first real pitched battle of the war, and was waged between the two largest armies engaged up to that time on this continent. The Federal forces were commanded by Brig.-Gen. Irvin McDowell, and the Confederates by Gens. Beauregard and Joseph E. Johnston.

Lieut.-Gen. Scott was still in command of the Federal army, but was rendered by age and infirmity incapable of

taking the field in person. The Union army, in front of Washington from the Chain Bridge to Alexandria, consisted of about 45,000 men, principally volunteers, with a battalion of 800 regulars. Gen. Robert Patterson was at Martinsburg with about 18,000 men, principally three months' volunteers. There he was confronted by Gen. Johnston with 8000 men. Patterson's general instructions were to keep Johnston in his front as a diversion to McDowell's proposed movement. McDowell received orders to begin his march on the 15th of June to attack the Confederates at Manassas Junction on the Alexandria and Orange Railroad, about 35 miles south-west of Washington. A glance at the topography will show that the defence of this point must be made along the line of Bull Run, a natural intrenchment, whither, on hearing of the Federal dispositions, the Confederates had retired through Centreville. McDowell's army was composed of five divisions, and contained 34,320 men. Gen. Runyon was ordered to march in rear to guard the communications, his most advanced regiments being 7 miles in rear of Centreville. This, with other slight deductions, reduced the moving column to about 28,000 men.

Along the stream the Confederate army occupied a line 8 miles in length. It consisted of six brigades, and two other brigades were in the rear as a support. The total effective force was 21,833 men, with 29 guns.

The Union army was set in motion on the afternoon of July 16, to converge by different roads upon Fairfax Court-house. This force, goodly in numbers, was an army only in name—undrilled, undisciplined, entirely ignorant of its commanders, with no cohesion, expecting soon to be discharged; a mob in uniform, inspired only with a vague and illusory hope.

McDowell's first plan was to feign an attack in front, and to move in earnest upon the enemy's right flank; but the country was so wooded and so little known that with such troops he was obliged to abandon this. He then determined to make his vigorous attack on their left flank. On the 18th, Tyler's division, which was in advance, reached Centreville, and, finding it evacuated, he with mistaken zeal pushed on to Mitchell's Ford, but soon found his advance exposed to such an artillery-fire as obliged him to fall back in confusion: he ordered forward a battery, and engaged in an artillery-duel which caused the enemy to retire across the ford and to call for reinforcements from Early. The Federal loss in this preliminary and unintended action was about 100; that of the Confederates, 78. After this McDowell made a careful reconnoissance to avoid all such chance encounters. This and other delays frustrated his purpose to make the attack on the 20th, and thus, as will be seen, greatly diminished his chance of success, especially as numbers of the three months' men were now clamorous to leave, their time having expired. But the worst result of the delay was that it enabled the main body of Johnston's "Army of the Shenandoah" to arrive and take part in the action. That general had arrived in person at noon of the 20th, bringing with him T. J. Jackson's brigade of five regiments and Bee's of four, which were in position on the morning of the battle on the 21st. Thus 6000 men and 20 guns had come up to reinforce Beauregard, realizing McDowell's fears: he could only now hope that Patterson was on their heels. He was to be disappointed. On leaving Patterson's front, Johnston's force had marched rapidly through Ashby's Gap to Piedmont, where they had taken the railroad to Manassas. Jackson's brigade was posted in the rear of Bonham, and Bee's in support of Cocke. The Confederates had a great advantage in a superior knowledge of the ground. Johnston was of higher rank than Beauregard, but he cheerfully accepted the plan of battle formed before his arrival, and left the general direction to the latter.

In pursuance of his plan to turn the enemy's left, McDowell, leaving Miles's division at Centreville, and unaware as yet that Johnston's force had come up, directed Hunter and Heintzelman to cross at Sudley's Ford, then to turn down the stream to Stone Bridge. Tyler was at the same time to attack and carry the Stone Bridge in front, join them as they came down on the right bank, and by a rapid movement seize the Manassas Gap Railroad and cut off the Confederate rear. They were all directed to carry four days' cooked rations, which it was hoped would last until supplies could reach them from Alexandria. Miles was to make a simultaneous demonstration from Centreville, with one brigade, at Blackburn's Ford.

Congress had adjourned pending the battle, and crowds of citizens and members of Congress had come to applaud the expected victory. The combined movement was ordered for the dawn of Sunday, July 21, at half-past two in the morning, so that Tyler would be in position at four, and Hunter and Heintzelman at Sudley's at six. The Confederate leaders, not yet aware of McDowell's plan, had determined to assume the initiative and attack the Federal force before the arrival of Patterson, whom they expected immediately after Johnston. But their plan was disconcerted, and they found themselves upon the defensive. The night of the 20th was exceedingly hot. Tyler's movement was delayed, and this kept Hunter and Heintzelman back. The former did not reach the Stone Bridge until six o'clock, and it was nearly ten before Hunter arrived at Sudley's. He crossed, however, unmolested, and marched down the right bank, followed by Heintzelman. Evans, who held the Stone Bridge, thought at first that Tyler's was the main attack: he was soon undeceived, and rapidly changed front on a line parallel to the Warrenton turnpike. Hunter placed Burnside in position, with Griffin's battery. Burnside attacked so fiercely that Evans called for reinforcements, which were supplied by Gen. Bee with six guns from the batteries of Imboden and Richardson. Burnside, pressed by this new force, was supported by Col. Sykes with the battalion of regulars. Gen. Hunter was wounded at this time, and the command of the division devolved on Burnside. Porter came up on Burnside's right; Sherman's brigade of Tyler's division came across a ford just above Stone Bridge; the left wing of the Confederates was driven back in confusion, and victory seemed secure for the Federal cause. The hope of the Confederate generals was now not to conquer, but to extricate themselves from utter destruction. To the military critic it seems clear that, instead of attacking in front, the Federal tactics should have been to pass around the already discomfited left of the enemy to the Manassas dépôt, by which the disorderly crowd would have been enveloped and captured. The former course was, however, adopted, giving an advantage to the Confederates. They were now on the plateau, and McDowell at the foot of the slope. He continued to press them and their resistance became stronger every moment. By twelve o'clock Johnston and Beauregard were on the plateau, where were 7000 men, well posted and partially concealed in the thickets and protected by the fire of thirteen guns. To dislodge them, the Federal force which had reached the plateau was about 10,000 strong, with

twenty-two guns, Porter of Hunter's division on the right, Franklin and Wilcox of Heintzelman's in the centre, and Sherman and Keyes on the left. The batteries were commanded by Griffin, Ricketts, and Arnold. Burnside's troops were out of ammunition, and were unable to participate in the action. Howard's brigade was still upon Bull Run. The Confederate army had taken heart and repelled every attack. By a fatal mistake, Griffin allowed a force of the enemy to come upon him, thinking that they were his own battery supports. His battery was taken and retaken, but at last was left upon the field. The preponderance was still in favor of the Federal troops, when a new element came in to turn the scale. This was the appearance on the unprotected Federal right of Elzey's Confederate brigade, led by E. Kirby Smith, the last contingent of Johnston's Army of the Shenandoah which had left Patterson's front—1700 fresh men thrown upon an exposed flank at a critical moment. Smith, guided by the firing, had stopped the cars at the nearest point, and had come into action at a double-quick on the Confederate left. This turned the tide: the enemy seconded this vigorous attack by an advance along the line. McDowell's force was arrested, driven back, rolled up, routed. It melted away, not more from panic than from want of cohesion. Instead of retreating by the nearest routes, the commands rushed back on the roads on which they had come, making thus long détours in their flight. The men threw away everything, broke through and tumbled over Howard's brigade, crossed the stream above Cub Run, the bridge over which was soon obstructed by a broken wagon. To rally them was impossible; all attempts to cover the retreat failed. Behind them were the Confederate cavalry and artillery. The reserves at Centreville could not stay the flying mass, but joined it, and in the midst of the wildest confusion what was left of the army made no stop until it was under the guns of the capital. The disaster was complete. Jefferson Davis, the Confederate President, had arrived on the battlefield at four o'clock. As he came up, the stream of Confederate fugitives on the road to Richmond convinced him that his army was defeated, when he found, to his astonishment, that their victory was perfect. The estimate of losses is not exact. Those of the Confederates were about 378 killed, 1489 wounded, and a few taken prisoners. The Federal army lost 481 killed, 1011 wounded, 1460 prisoners, and 25 guns captured or destroyed.

In the *second battle* of Bull Run, in August, 1862, the Union army was commanded by Major-Gen. John Pope, and the Confederates by Gen. R. E. Lee. The former had been assigned on June 26th to the command of the Army of Virginia, consisting of all the Union forces in Virginia except those under Major-Gen. McClellan, then in front of Richmond. The attempt to capture the Confederate capital having failed, McClellan was ordered Aug. 3d to remove his army to the Potomac at the mouth of Acquia Creek. Gen. Pope had left Washington July 29th to threaten Gordonsville and prevent Lee from concentrating his forces to attack McClellan while the removal was going on. Gen. "Stonewall" Jackson, who had already been operating near Gordonsville, resisted Pope's movements, but did not prevent him from advancing to the Rapidan. Pope had about 49,000 men, while Jackson had only 23,000. When Gen. Lee saw McClellan actually withdrawing, he ordered Gen. Longstreet with about 32,000 men to march against Pope, and the latter retired to the line of the Rappahannock to await the arrival of reinforcements from McClellan's army. Finding it impossible to cross this river in front, Lee then sent Jackson on a hazardous expedition around the Union right to cut Pope's railroad communication at Manassas Junction. Jackson, having passed through Thoroughfare Gap in the Bull Run Mountains, which had been left entirely unguarded, reached the railroad at Bristoe Station, and afterwards destroyed immense supplies at Manassas Junction intended for Pope's army. He then withdrew towards the former battlefield of Bull Run, where he could be more readily joined by Longstreet, who was also coming through Thoroughfare Gap. Pope, supposing the enemy to be still in the neighborhood of Manassas Junction, ordered his scattered corps to concentrate there, and even when he found this place deserted still inclined to the belief that Jackson had gone to the east to destroy the Union stores. But the latter, who had marched north-west near the battlefield of Bull Run, where the deep cutting of an abandoned railroad furnished a strong defence, soon came to the conclusion from the movements of Pope's army that it was in full retreat to Washington. The battle of Gainesville, brought on accidentally on Aug. 28th, revealed to each side more clearly the object of the other, and on the next morning Pope felt confident that he would capture or destroy Jackson's army unless it should be joined by Longstreet, whom he supposed to be still distant a day's march. In fact, however, Longstreet was already at Gainesville, and joined Jackson at Groveton about noon. At 9 A. M. Pope had issued a joint order to McDowell and Porter, who were on the left of the Union army, to move on Gainesville and to be ready to fall back behind Bull Run at night for supplies. Porter had already marched from Bristoe Station back to Manassas Junction and towards the enemy, but, being isolated, did not make an attack. McDowell, finding the execution of the movement impracticable on account of Longstreet's march past Gainesville, withdrew to join the rest of Pope's forces. Porter remained where he was, watching the enemy in front, sending out scouts to find McDowell, and waiting for further orders. Meantime, a desperate battle was fought at Groveton, and Jackson, who stood strictly on the defensive, seemed to be driven back. Gen. Pope sent to Porter an order dated 4.30 P. M. ordering him to push into the action at once on the enemy's right flank. The order was received about 6 P. M., but Porter, on account of Longstreet's presence in his front, delayed moving, and early the next morning, after new orders, joined the main army. On this day (Aug. 30th) Longstreet's troops were massed south of the Warrenton turnpike, while Pope's attention was entirely directed to Jackson's smaller army on the north side. He ordered Porter to advance, supported by Hatch on the right and Reynolds on the left. This attack was pressed vigorously, compelling Jackson to send to Lee for reinforcements, but Longstreet instead brought artillery to bear on the front of Jackson's position. The attacks farther to the right were not serious, for Longstreet now began to assail the left flank of the Union army. Although taken by surprise, the Union troops, under Col. G. K. Warren, occupied and held for a long time Bald Hill, a strong position south of the pike; and when, at last, they were driven from this hill, another hill close by Bull Run was held by Gen. Sykes with two brigades of regulars and a number of other troops. To hold it was essential to the safety of Pope's army, which was now in full but orderly retreat before Jackson's advance. When darkness set in the regulars

were withdrawn, and Gibbon's brigade was stationed there till after 8 P. M. Soon after midnight the last of the Federal army crossed Bull Run and destroyed the bridge, the army retiring in good order to Centreville. The Confederate loss was reported at 7241, but was probably greater, and that of Pope's army about 11,000, but there was also a large number of stragglers. As the Union army had thus again retreated almost to Washington, while the campaign had been opened by a too boastful proclamation, public judgment turned strongly against Gen. Pope, and a few days later he was removed from his command, Gen. McClellan being again appointed to the command of all the forces. Gen. Pope made two reports of the operations of his army, and attributed his failure to the lack of co-operation or treacherous conduct on the part of the officers who had come from Gen. McClellan's army. In consequence of these charges, Gen. Fitz-John Porter, who had remained in command of his corps, was tried by court-martial Nov. 27, 1862, and was convicted of disobedience to the "joint order" and to the "4.30 P. M. order" of Aug. 29th. On Jan. 21, 1863, he was sentenced to be cashiered. He professed his entire innocence, and repeatedly asked for a rehearing of his case. This was finally granted by Pres. Hayes in April, 1878, and a board of army officers under the presidency of Gen. J. M. Schofield was convened. By their report, made in April, 1879, they exonerated Gen. Porter. He has since applied to Congress for restoration to the rolls of the army, but thus far without effect. The controversy has not yet been fully settled.

BÜLOW, HANS GUIDO VON, a German musician, was born in Dresden, Jan. 8, 1830. He cared little for the art of tones in his early years, but after a long illness he suddenly and unaccountably found himself craving for music. In 1848, while engaged in the study and practice of law at Leipsic, he was taught counterpoint by Hauptmann. In 1849 he became a member of the University of Berlin, and published several political articles. On hearing the opera of *Lohengrin* at Weimar, under the conductorship of Liszt, Bülow gave up the faculty of law and went to Zürich to consult with Wagner. The following year (1851) he began a course of study under Liszt's direction, and in 1853 started on his first concert-tour. Two years later he united with Messrs. Stern and Marx in the formation of a music-school. Subsequently he attempted, with Wagner's co-operation, to institute at Munich a singing-school for the special purpose of training artists for the operatic stage. Bülow has since given many concerts in all parts of Europe and America, and especially distinguished himself as a conductor of Wagnerian operas. He married a daughter of Liszt, who afterwards was divorced from him and became the wife of Richard Wagner.

Bülow's chief compositions are *Opus 20* (*Symphonisches Stimmungsbild Nirwana*); *Opus 16* (a ballade for orchestra in "Der Sänger's Fluch"); and music for Shakespeare's *Julius Cæsar*. *Il Carnevale di Milano*, which consists of ten *ballabili e intermezzi* for the pianoforte, is an interesting collection of movements that have attracted the attention of critics from the ingenious manner in which the melodies are developed and intertwined, and specially for the employment of part-writing, which is so rarely found in a galop or waltz.

BUNKER'S HILL, commonly called BUNKER HILL, an eminence opposite Boston near which was fought the first real battle of the Revolutionary war on June 17, 1775. The British army, under Gen. Gage, numbering 10,000 men, occupied Boston, where, landward, they were shut in by the Americans, the cordon becoming stronger day by day. Gen. Artemas Ward was at Cambridge with 9000 infantry and four companies of artillery; Gen. Thomas, with 5000, composed of troops from Massachusetts, Connecticut, and Rhode Island and three companies of artillery, was on a line from Roxbury to Dorchester: this formed the right wing. The left wing lay from Medford to the Chelsea Hills. The peninsula upon which Charlestown stands lies opposite the northern side of Boston, separated from it by the Charles River, which was commanded by the British battery of Copp's Hill on the Boston shore. On this peninsula are two elevations: the one nearest the extremity, known as Breed's Hill, is seventy-five feet high; and the other, called Bunker's Hill, one hundred and twelve feet high. Both these commanded the town and the shipping in the river. This peninsula is connected with the mainland by a very narrow strip of land called the Neck, over which the road to Cambridge passes. A council of war was held by the American generals to consider the propriety of fortifying the peninsula. Gens. Ward and Warren opposed the plan, but it was carried by the urgency of Putnam and Pomeroy; Col. William Prescott also favored it. A little before sunset on the 16th of June a body of 1200 men, with picks and shovels as well as their muskets, was paraded in front of the headquarters at Cambridge, and, starting at 9 P. M., crossed the Neck. They were commanded by Col. Prescott and led by an engineer, Col. Gridley, who had before examined the ground. They moved so quietly that they were undiscovered. The question at once presented itself, Which eminence should they fortify? The crests of Bunker's and Breed's Hills are about 700 yards apart. The orders were explicit to fortify the former, but when on the ground the opinion of Putnam prevailed that it should be Breed's Hill. The lines of the redoubt were soon laid out, and although there was great delay the men worked with a will. Patrols who were sent down to the shore heard the British sentinels opposite crying "All's well." By morning a strong redoubt eight rods square had been erected, and an exterior line of breastworks extended from the crest of Breed's Hill to the slough. The entrenching tools were then sent to Bunker's Hill. At dawn on the 17th the work was seen by some sailors on the British ships of war, and they immediately opened fire, doing very little damage, however, as only one man was killed. The surprise was complete. Boston was roused. Gen. Gage came down to Copp's Hill, from which, through a glass, he could descry Col. Prescott on the parapet. In a council of war hastily called it was decided that the works must be stormed, and, as it was not probable that raw militiamen would fight, the storming-party should land directly in front and charge up the hill. Meantime, the Americans were sleepy and hungry and scantily supplied with ammunition. Fresh men were needed, and Prescott sent to Ward for reinforcements. The latter at first was not disposed to comply, but later sent Gen. Stark with 500 New Hampshire troops: a few of these were retained to fortify Bunker's Hill, but the main body reached the redoubt.

About noon the Americans saw twenty-eight barges leave Boston in parallel lines, filled with troops in scarlet uniforms and bringing several brass field-pieces. The force was commanded by Major-Gen. Howe, under whom, as second, was Gen. Pigot. They landed at Moulton's Point, a little to the north of Breed's Hill,

See Vol. IV. p. 466 Am. ed. (p. 521 Edin. ed.).

and halted to form the columns of attack and to await the coming of reinforcements which Howe requested from Gage. These were sent, and landed between Moulton's Point and Charlestown. The Americans made good use of this time in strengthening the redoubt and in making a novel kind of entrenchment which was to do good service. There was a post-and-rail fence running down to Mystic River. A few feet in rear of this posts and rails were set up, and the space between was filled with new-mown hay. This was proof against musket-balls. At two o'clock Warren arrived: he had been appointed a major-general, but had not yet received his commission. He therefore declined the command and served as a volunteer. Immediately after this the assault was begun. Pigot, with the left wing, marched up to the redoubt, while Howe, with the right, undertook to turn the American left. A brisk discharge of the field-pieces and howitzers of the assaulting force covered their approach: they then delivered one volley of musketry and rushed forward. The Americans reserved their fire until Pigot was within thirty or forty yards of the work, when a volley was given with fatal effect. The troops halted; many fell back, some approached to within pistol-shot, when another well-directed volley and a flanking fire from a few American troops in Charlestown threw them into utter disorder and drove them back to the landing. Howe's right wing fared no better: they advanced along the Mystic to the post-and-rail defences, where they were received by similar volleys at short range, and were driven back to the boats.

At this time, while the Americans were preparing to resist another attack, Charlestown, which was built chiefly of wood, was set on fire by a carcass thrown from Copp's Hill, and was soon wrapt in flames. On every eminence and on many housetops were interested spectators, giving dramatic effect to the action.

The British lost no time in organizing a second attack, but with no better success: again they were driven pell-mell down the hill. In conducting a third they were more prudent: instead of approaching in front, they assaulted the left flank between the breastwork and the fence, making only a feint of attack in front. Here too they could enfilade the left of the redoubt with field artillery. By this time the ammunition of the Americans began to give out; many of the men were without cartridges and their muskets had no bayonets. This third attack was successful. The British entered the work, not without a hand-to-hand struggle on the parapet, where many of the Americans fought bravely with clubbed muskets. Prescott reluctantly ordered a retreat: a last British volley killed Warren, who had displayed great valor and coolness during the entire action, and who was among the last to leave the redoubt. Stark still held the fence to cover the retreat; Putnam implored them to make another stand at Bunker's Hill, but in vain: the entire force, unpursued by the enemy, crossed the Neck and marched to Cambridge, defeated, but satisfied and defiant.

The British strengthened the captured works and erected others. The American loss was 450; the British, 1054. Among the latter was Maj. Pitcairn, who had commanded the expedition to Lexington.

The results of the battle of Bunker's Hill were greatly in favor of the American cause. It led to the evacuation of Boston by the British forces a short time after; it gave prestige to the raw troops, and showed that we had commanders only needing opportunity and development; and it opened the eyes of England to the serious and difficult character of the task she had undertaken. A tall granite obelisk, 221 feet high, 31 feet square at the bottom and 15 feet at the top, marks the place of the redoubt on Breed's Hill. The cornerstone was laid by La Fayette on the semi-centennial day of the battle, June 17, 1825, when an oration was delivered by Daniel Webster. It was completed in 1842, and dedicated in 1843, when Daniel Webster was again the orator of the day. The cost was $150,000. (H. C.)

BUNSEN, Robert Wilhelm, an eminent German chemist, was born March 31, 1811, at Göttingen, where his father was professor of Oriental literature. Entering the university of his native city, he studied chemistry, physics, and geology, and graduated there in 1831. In 1833 he acquired the *venia docendi*, and in 1836 took the chair of chemistry at the Polytechnic Institute in Cassel. In 1838 he was appointed professor extraordinarius at the University of Marburg, and in 1841 was advanced to the grade of professor ordinarius. In 1851 he accepted the professorship of chemistry at the University of Breslau, and commenced there the erection of the chemical institute. In 1852 he became professor at the University of Heidelberg, which position he still occupies. On the fiftieth anniversary of his acquiring the degree of doctor of philosophy the grand duke of Baden conferred upon him the rank of privy counsellor of the first class. In 1882 the French Academy bestowed upon him the highest honor in its gift by electing him foreign associate.

His lectures have been very attractive and popular, not only from the beauty of his style, but also on account of their thoroughness and his brilliant illustrations. Those who have been familiar with him as his associates in the laboratory learned to esteem him as one of the purest and best of men—a man of kind heart and liberal disposition. He lives and works solely for the development of science, often with such enthusiasm and absorption as to make him absent-minded as regards other affairs. Hence many good stories whose point he enjoys himself. Bunsen has never married; he always has been free from family ties. He is the last of that great trio of most distinguished chemists of the earlier period of this century—Wöhler, Liebig, and Bunsen. Each of them stands pre-eminent in the branch to which he devoted his researches. Of the three, Liebig was perhaps the greatest chemical genius, but Bunsen has been undoubtedly the most eminent by reason of possessing a far more general education, and especially a thorough mathematical knowledge, which served him in investigating many questions which the mere chemist or physicist would have found most difficult. Bunsen's investigations are models of scientific thoroughness; no important point is ever lost sight of, and the whole subject is worked up in the most painstaking way and in every direction. Many of his most important investigations are not concerned with subjects entirely novel. He frequently takes up observations which either no one else had thought it worth while to follow up, or which had failed to give favorable results in the hands of others. His remarkable success with these must be attributed to his great mental resources and mechanical skill, which enable him sometimes to overcome the greatest difficulties by the simplest means.

Bunsen introduced himself to the scientific world by publishing in 1834, jointly with Berthold, an antidote against arsenical poisoning in the freshly-precipitated ferric hydroxide. Many lives have been saved by it, and Bunsen was rewarded with a gold medal by the Prussian

Government. Next in order comes, in 1835, an investigation giving the chemical and crystallographic properties of a new class of ferrocyanides with ammonia, and double salts of ammonium ferrocyanide with ammonium chloride and bromide.

In 1837 he made the first announcement of one of the most important discoveries in chemistry, that of the so-called cacodyl compounds. In 1760 a French chemist, Cadet, found that if equal quantities of arsenious oxide and dry potassium acetate are subjected to destructive distillation, a dark, reddish-brown, heavy liquid is obtained which has a frightful odor, and which fumes and burns when in contact with air. Bunsen found that the chief portion of Cadet's liquid is a substance which he called "alcarsin," the oxide of a radical for which he subsequently adopted the name "cacodyl," and which is now known as "arsendimethyl." This was the *first* organo-metallic radical which was found, and the discovery opened a new field for research.

In 1840, Bunsen succeeded in the isolation from the chloride, by means of metallic tin, of the radical cacodyl C_2H_6As, a true organic metal, capable of combining with oxygen to form cacodylic oxide and cacodylic acid, which yield numerous salts; with sulphur to form analogous sulphides and sulphosalts; with selenium and tellurium to form selenide and telluride; with chlorine, bromine, iodine, and fluorine to give chlorides, bromides, iodides, and fluorides, oxysalts of these compounds, and double salts with metallic chlorides and oxides; with cyanogen, a fearfully poisonous cyanide. These all show such a strong resemblance to metallic salts that the discovery of cacodyl became one of the strongest pillars in the support of the theory of compound radicals. In making this investigation Bunsen was the pioneer in a dangerous field which required great skill in execution and steady perseverance during seven years of labor. Most of these compounds have a horrible odor, are very volatile and highly poisonous; many are spontaneously inflammable and dangerously explosive. Bunsen lost the sight of one eye by the explosion of a tube when analyzing the cyanide. This, which is one of the most beautiful compounds, crystallizes in large crystals, sublimates like camphor, and is most dangerous. Bunsen barely escaped with his life when working with it.

Whilst still engaged with the investigation of the cacodyl compounds he published several smaller chemical and mineralogical articles, and in 1838 some preliminary results of one of his memorable researches, that on the gases of blast-furnaces. The gases of charcoal-furnaces were first investigated, then, in 1840, those of the coke-furnaces used for the reduction of copper shales at Friedrichshütte near Riechelsdorf, and finally, jointly with Dr. Lyon Playfair, in 1845, those of the Alfreton iron-furnaces in England. The last especially will always stand as one of the masterpieces of scientific research, and the practical results gained by it were of the highest importance in the iron industry. When Bunsen commenced these investigations accurate methods of gas-analysis were nearly unknown, and he was obliged almost to create a new branch of analytical chemistry, on which he in 1857 published his *Gasometrische Methoden*. A glass tube closed at one end, with platinum wires sealed in, graduated with a millimetre scale, and most accurately calibrated, constituted his eudiometer, almost his entire apparatus. In order to arrive at high accuracy in gas analysis, many of the physical and chemical laws which govern such processes had to be subjected to careful and extended investigations, the most important of which were those on the influence of gases upon the combustibility of oxygen and hydrogen, on the law of the absorption of gases, on the diffusion of gases, and on the determination of the specific gravity of gases and vapors.

The year 1841 brings us another very important fruit of his fertile brain in the form of a new galvanic battery, in which he substitutes carbon for the copper or platinum element. At first this first carbon-zinc battery was unpleasant through the nitrous fumes which it emitted, but since he substituted in 1875 potassium dichromate and sulphuric acid it has attained a form which is used for telegraphic and other technical purposes as well as for research in the laboratory. In the progress of these investigations Bunsen published a number of smaller articles, the most important of which are on the thermal springs of Nauheim, on the composition of the salamanders from the copper-furnaces at Riechelsdorf, on the Carboniferous territory of the Maremma, and on the analysis of parisite, the latter by a very ingenious indirect method. Next in order came his great investigations of the volcanic phenomena of Iceland. When, in 1845, the news of the great eruption of Hecla reached Marburg, Bunsen, desiring to study the phenomena connected with it from a chemical and physical point of view, obtained leave of absence during the summer of 1846, and the time intervening was used in preparing a perfect outfit of accurate thermometers and other appliances for scientific observation. One of his objects was the study of the geyser-operations, as he was convinced that the generally accepted cavern theory was not based upon sound physical principles; and a result of his studies in Iceland was the publication of a new and ingenious theory of geyser-action. Of not less importance were his geological investigations on the processes of the formation of the volcanic rocks in Iceland. From numerous analyses of Icelandic rocks Bunsen came to the conclusion that all belong to one of two types, the extreme members of which are the normal trachytes, with an oxygen ratio between the silicic acid and the bases of nearly 3 : 0·6, and the normal pyroxenic rocks, with a ratio of 3 : 2. He made other interesting observations, and traced the agency of volcanic gases and steam in the decomposition of rocks.

In 1852 he entered upon a new field of research, the reduction of metals by electrolysis. In this investigation his perseverance and ingenuity overcame many difficulties. The first metal which he reduced from its chloride was magnesium. Subsequently, in 1854, by the use of a very dense current he separated chromium in large plates from the chloride, then manganese and aluminium; and in 1855, jointly with Dr. Matthiesen, he isolated the metals calcium, strontium, barium, and lithium. Later in 1875 the metals cerium, lanthanum, and didymium were isolated in large globules under his direction by his pupils Hillebrand and Norton.

In 1853 he introduced into analytical chemistry a neat volumetric method of very general application and great accuracy, based upon the liberation, either directly or indirectly, from any of the higher oxides, of an equivalent quantity of iodine, the amount of which he determines by titration with dilute sulphuric acid. Jointly with Roscoe, during the years 1855 to 1862 he was engaged in a very elaborate series of photo-chemical researches with reference to the laws and measurement of the chemical action of light: on photo-chemical induction; the optical and chemical extinction of rays of light, their comparative and absolute measurement, and

the measurement of the chemical action of sunlight.

His next investigation was a purely chemical one, which greatly taxed his patience and skill. It is on the preparation of pure cerium compounds, the separation of cerium from lanthanum and didymium, and an investigation of their salts. This was followed by an important paper on the distinction of the different oxides of antimony, and a new method for the separation of antimony and arsenic, which was more fully developed in a subsequent communication in 1878; another one on blowpipe experiments, in which he shows that by the use of the gas-lamp, which he had introduced several years before, the presence of the different alkalies and alkaline earths in feldspars and similar minerals could easily be recognized, and even their relative quantity approximately determined.

Of all the researches of Bunsen, important as they always were, none has given such remarkable results as the introduction of the spectrum as a means of chemical analysis, which he jointly made with his colleague Kirchhoff. With the development of this branch almost a new era begins in scientific research. They were not the first, however, who observed that if a colored flame was viewed through a spectrum peculiar bright lines would appear. Sir John Herschel in 1822 and Talbot in 1834 had made interesting observations in this direction. But these observations, and others like them, had comparatively little influence upon the progress of science until, in 1859 and 1860, Bunsen and Kirchhoff, by a complete investigation, founded the method of spectral analysis, giving at first the spectra of the metals whose salts color a non-luminous flame, like those of the alkalies and alkaline earths. One of the first fruits of spectrum analysis was their discovery of cæsium, a new alkali-metal, in the mineral water of Dürkheim, distinguished by two blue lines, and shortly afterwards by that of a second alkali-metal, rubidium, showing a characteristic red line in the spectrum. The residuum obtained from this water being very scanty, they evaporated forty tons at once, in order to procure a sufficient quantity for a fuller investigation of the relations and analogies of these two new metals so closely allied to potassium. Their researches proved the existence of these metals in many minerals, mineral waters, and refuse products of chemical industries. The relations between the bright lines produced by colored flames and the so-called dark lines of Fraunhofer, the reversion of the bright lines into dark ones, the absorption-bands, the nature and composition of the light of the sun and the stars, and many other points, were gradually brought out by their more extended researches.

In 1875, Bunsen introduced his chromic-acid battery, mentioned above, and in connection with it a new apparatus for spectrum analysis by electric sparks, and gave the results of his investigation of the flame-spectra and also of the absorption-spectra produced by the chlorides of the metals cerium, didymium, lanthanum, yttrium, and erbium.

During the progress of his spectroscopic researches he was working on several other subjects, among which the investigation, made jointly with Bahr, of the earths contained in gadolinite, erbia, and yttria, their separation and determination, and of their salts, is one of the most important. This was followed in 1866 by a paper on flame-reactions, in which he shows that by very simple and ingenious methods, with hardly any other apparatus than his gas-burner, the presence of nearly one-half of all the known elements can be ascertained very rapidly and with great certainty.

There is in inorganic chemistry perhaps not a more difficult subject than the separation of the platinum metals. He has commenced this investigation with material furnished by the mint in St. Petersburg, and has overcome many of the difficulties by new and accurate methods, of which he published the first part in 1868, having especial reference to the separation of pure rhodium. In the course of this important investigation he was seriously injured by an explosion. In 1870 he described a series of calorimetric investigations, in which he determines with great accuracy the specific gravity of ice, and, based upon this, his new ice-calorimeter for the determination of the specific heat of bodies, etc. In his investigations he has been compelled to resort to more simple and accurate methods and apparatus; analytical chemistry is especially and greatly indebted to him, not only for many laboratory contrivances, such as his gas-lamp, his filter-pump, and others, but also for methods of analysis, many of which are now in general use on account of their simplicity and accuracy. (F. A. G.)

BUNTING (etym. dubious), a name applied with little discrimination to various species of birds of the family *Fringillidæ*, chiefly those composing the genus *Emberiza* of Linnæus. The bunting properly so called is *E. miliaria* of Europe. Numerous North American birds, not even of the same genus, have received the same name, as snow-bunting, *Plectrophanes nivalis;* towhee-bunting, *Pipilo erythrophthalmus;* lark-bunting, *Calamospiza bicolor;* black-throated bunting, *Spiza Americana.* There was formerly supposed to be a character of the palate by which the "buntings" collectively could be distinguished from other *Fringillidæ*, but such has proven not to be the case. (E. C.)

See Vol. IV. p. 470 Am. ed. (p. 525 Edin. ed.).

BURDEN, Henry (1791–1871), an American inventor, was born at Dumblane, Scotland, April 20, 1791. He was the son of a farmer, studied engineering at Edinburgh, and came to America in 1819. Engaging in the iron manufacture, he soon made an improved plough, and in 1820 the first cultivator used in America. In 1822 he became agent of the Troy iron and nail factory. Numerous patents were issued to him —one in 1825 for making wrought spikes, one in 1835 for making horseshoes, one in 1840 for making the hook-headed spikes used on American railroads, and another for a machine to make blooms out of puddlers' balls, and one in 1849 for a machine to make iron bars. His greatest invention, patented in 1857, was a machine for making horseshoes, by which sixty shoes are made from iron bars each minute. This machine has also been patented in several European countries. In 1833 he built an enormous steamboat, which, from its peculiar shape, was called the "cigar-boat," and he advocated the construction of large steamships for ocean navigation. He finally became sole proprietor of the iron-works with which he had long been connected, and which had been greatly enlarged under his management. He died at Troy, N. Y., Jan. 19, 1871.

BURDETT-COUTTS, Angela Georgina, Baroness, an English philanthropist, youngest daughter of Sir Francis Burdett, was born April 25, 1814. Her grandfather, Thomas Coutts, a wealthy banker, married late in life a popular actress, and left to her an immense fortune. The latter was afterwards married to the duke of St. Albans, but having no children, made Miss Burdett her heiress on condition that she should add Coutts to her name. It was also stipulated that in case she married a foreigner she should lose one-

third of this fortune. On coming into possession of her wealth in 1837, she began a life of studious and systematic beneficence, giving largely, not to one particular favorite scheme of charity, but to many and widely-differing objects; and not indiscriminately, but considerately, by keeping statistics of work accomplished and to be accomplished, and gathering innumerable facts with painstaking care, that her noble deeds might not fail of their intention. The evil effects attending lavish gifts, such as injuring the self-reliance and self-respect of recipients or encouraging pauperism, have been avoided as far as possible by most vigilant and continuous supervision. She built new schools and churches in districts that were inhabited chiefly by the poor, including a handsome church at Carlisle in Cumberland and the magnificent church of St. Stephen's in Westminster, besides the three schools and clergy-house in its precincts. The bishoprics of Adelaide, Cape Town, and British Columbia she endowed with the sum of more than $250,000. She founded an establishment in South Australia for the benefit of the aborigines; provided funds for Sir Henry James's topographical survey of Jerusalem; favored and assisted the emigration of Scotch and Irish families to Australia and elsewhere under certain well-planned conditions; built a model farm for the education of the Dyaks of Sarawak; gave vessels and fishing appliances to poor Irishmen; and instituted an organization and fund for the relief of Turkish and Bulgarian peasantry during the Russian invasion, sending to the British ambassador more than $150,000. In London her labors have been incessant, for connected with the emigration scheme was a reformatory or home for poor and unfortunate women, which was established at Shepherd's Bush, in London, where, after a period of seven years, the inmates were sent to the colonies to start life afresh. To extend the benefits of the new educational plans of the English Government to poor districts that were thinly populated, she devised an elaborate scheme of providing inspecting schoolmasters, who visited various places periodically and directed the studies; which plan the Government adopted. When the Spitalfield weavers were rendered destitute by the loss of their work, she instituted schools near by in Brown's Lane, London, where adult women were fed and provided for generally, and taught to sew. Government contracts were then obtained to utilize the work done. The baroness has also given innumerable outfits for poor servants and destitute women and some hundreds of boys, who were thus enabled to enter respectively industrial homes and the royal navy.

One of the most popular schemes was the establishment of the "Shoe-black Brigade," in which boys were tested as to their real character and general fitness for promotion, and in due time were provided with work by railway companies or were admitted to the army or navy service. Where "Nova Scotia" Gardens once harbored thieves and the worst characters in London, now stand the model dwellings known as "Columbia Square," where 200 families enjoy pleasant homes at nominal cost. The baroness has also erected drinking-fountains, opened her grounds at Highgate Villa to thousands of school-children, and converted a churchyard in the heart of London into a garden of rest for the poor.

In 1871 the prime minister tendered her the offer of a peerage from the queen; in 1872 she was presented with the freedom of London, and of Edinburgh in 1874. The baroness in 1882 married Mr. J. Ashmead-Bartlett, an American, who was elected Conservative member for Westminster in 1885.

BURDETTE, ROBERT JONES, American journalist, eldest son of Frederic E. Burdette, accountant, of Huguenot descent, was born in the village of Greensboro', Pa., July 30, 1844. During his infancy his parents removed to Cincinnati; thence, in 1852, to Peoria, Ill., where Robert passed his boyhood and youth. He received a common-school education, graduating at the Peoria high school in 1861. In 1862 he enlisted in the Forty-seventh Illinois infantry, and served as a private soldier in the Union army during the war of the rebellion. In 1868 he entered the field of journalism as night editor of the *Peoria Daily Transcript*, retaining that position two years, when he accepted the position of city editor on the *Evening Review* of that city. On the failure of this paper in Jan., 1873, he went on the staff of the *Hawkeye* in Burlington, Ia., as city editor, rising to the position of managing editor in 1875. In 1876 he went on the platform as a humorous lecturer, still retaining a position on the editorial staff of the *Hawkeye*. His humor is racy, characteristically American, free from grossness of any kind. His wife became a chronic invalid, and for the sake of her medical treatment he removed to the vicinity of Philadelphia in 1880. He was ordained to the Baptist ministry in 1887.

BURGLARY, breaking and entering by night into a mansion-house with intent to commit a felony—a crime of a very gross character, as being aimed against the security of the citizen's home at a time when he is naturally off his guard. This crime being a felony, the perpetrator may be lawfully resisted, even to the extent of killing him; though, if he can be arrested and the crime thus prevented, it would be felonious homicide to kill him. It is not a breaking merely to enter a house through an open door or window, even if it has to be pushed farther open. Not only the violent tearing open of a door or other part of the house, however, is held sufficient; but if the latch of a door is lifted, or the sash of a window pushed up, or a closed folding window pushed open, or if, through fraudulent artifice, the inmates are induced to open the door or window and let the burglar in, or if he makes his entry through a chimney, any of these methods will be sufficient. If, moreover, the criminal enter by an open front door and afterwards break open an inner door, or if, having gotten in without a breaking, he afterwards commits a breaking in order to escape, this also will be sufficient. In order to constitute burglary, there must also be an entry, but the breaking and entering may be effected at different times, provided that both are in the night. The entry need not be the actual corporeal entry of the whole body of the burglar; it is sufficient if he merely introduces a part of his body, or even an instrument with which to remove articles from the house. The offence must be committed at night while there is not sufficient light from the sun to distinguish a face. The building entered must be a mansion-house or the outbuildings attached to it, and the dwelling must be one in which persons reside, at least at times. It is not necessary that any one be actually in it at the time, but there must be the *animus revertendi*. A servant in a house who breaks into another room with felonious intent commits burglary; so does a guest at a hotel who breaks into another guest's room with such intent, though he does not if he merely forces his way out of his own room and enters the bar-room or other part of the house to which he has an equal right with others. A distinction exists between such cases and those where the whole house is let out to different families, where the part of the house occupied by each person becomes

See VOL. IV. p. 477 Am. ed. (p. 534 Edin. ed.).

in a fashion his dwelling-house. It is also a burglary if the house entered, though not a dwelling-house, be an outhouse and parcel of the dwelling-house, not separated by a public road. It was also held in England, and probably the same would hold in America, to be burglary to break and enter a church, as also a walled town. There is a further requisite to the crime, and that is the intent to commit a felony after the intent to break and enter has been accomplished; hence, two intents are required in order to constitute the crime. The crime intended to be committed must be a felony, and not a mere misdemeanor, as an assault and battery. Larceny is very commonly the intent present, but murder, rape, or any other felony will equally constitute the crime. At the common law, the penalty was death, but it was within the benefit of clergy; clergy was, however, taken away later by statute. The punishment in England now is ordinarily transportation or imprisonment, but in cases where there is the aggravation of injury done to a person, death is the penalty. The head has been very much widened by statute in America and in England; thus, burglary may now be committed in many erections other than dwellings and having no connection therewith; or by a similar crime committed in the daytime—or without any breaking—or in the daytime and without breaking. The penalty generally varies with the circumstances of aggravation attending the crime. Some of the States divide the crime into various degrees; thus, the New York code makes three degrees, the first of which is about the same as the common-law offence, only committed in the mansion-house itself, in which there are actual residents at the time, and not in mere outbuildings; the second includes the like offence committed in the daytime, or where the crime is committed at night, but some of the requisites of the first degree are wanting, or where, whether committed by day or night, any of the foregoing requisites are wanting, or where one breaks merely an inner door or one in the house by consent breaks out at night. The third degree may be committed by day or night in any outbuilding or in any store, car, vessel, canal-boat, etc., where valuable things are kept. The penalty in each degree is imprisonment, but for shorter terms in the lower degrees. The details of the laws of the different States on the subject differ very largely, though the cardinal principles of the common law are adhered to.

BURION (Span.), a name applied in the Southwestern United States to the house-finch, *Carpodacus frontalis*, and other species of that genus, family *Fringillidæ*. The male is streaked brown and white, with crimson forehead and breast, and tinged with red in other places; the female much plainer; length six to seven inches. Very abundant and familiar, breeding freely about houses, and highly melodious. (E. C.)

BURLINGAME, ANSON, LL.D. (1820–1870), an American diplomatist, was born at New Berlin, N. Y., Nov. 14, 1820. His father soon after moved with his family to Ohio, and still later to Michigan. He was educated at the University of Michigan, and studied law, graduating from the law-school of Harvard University in 1846. He began to practise in Boston, and soon became a popular orator with the Free-Soil party. In 1852 he became a State senator, and the next year was a member of the State constitutional convention. In 1854 he was elected to Congress by the American party, but soon assisted in forming the Republican party, and took a prominent place in the slavery discussions. Having severely denounced the outrage committed by Preston S. Brooks on Senator Sumner in 1856, he was challenged by Brooks, and accepted the challenge, but the duel never took place. In March, 1861, he was appointed by President Lincoln minister to Austria, but that Government refused to receive Mr. Burlingame on account of his numerous speeches in favor of the independence of Hungary, and he was appointed minister to China, which position he held till 1867, doing much to bring China into amicable relations with the Western nations. When about to return home, Prince Kung, the regent of the empire, appointed him special ambassador to the United States and the leading powers of Europe, an honor never before conferred on a foreigner. Accordingly, Mr. Burlingame returned at the head of a numerous suite in March, 1868, concluded a new treaty in July, and then proceeded for the same purpose to England, France, Denmark, Sweden, Holland, and Prussia, in all of which, except France, he succeeded in effecting important treaties. By these China for the first time secured and accepted the rights, duties, and privileges of a nation under international law. The treaty with the United States also guaranteed to Americans in China and to Chinese in America liberty of conscience and of worship, the right of travel and of residence, and pledged national co-operation in suppressing the coolie trade. Mr. Burlingame had just arrived at St. Petersburg in prosecution of his mission when he was suddenly attacked with pneumonia, and died there, Feb. 23, 1870.

BURLINGTON, the county-seat of Coffey co., Kan., on the Neosho River, 100 miles S. W. of Kansas City, on the Missouri, Kansas, and Texas Railroad, is the terminus of a branch of the Atchison and Santa Fé Railroad. The Nebraska and Memphis Railroad also passes through this place. Burlington has a bank, good schools, seven churches, fine hotels, and two weekly newspapers. A dam across the Neosho River here furnishes power for a large flour-mill, a woollen-factory, a glucose-factory, and other works. This was a small Indian trading-post in 1856, and was incorporated as a village in 1862 and as a city in 1871. Population, 2239.

BURMEISTER, KARL HERMANN KONRAD, a German naturalist, was born at Stralsund, Jan. 15, 1807. After a preliminary course of study in his native town, he went to the University of Greifswald, where he devoted himself to medicine and natural science. Removing afterwards to Halle, he graduated in 1829. After spending a year in Berlin, he entered upon his career as instructor in Joachimsthal, and passed thence to Cologne. In 1837 he was appointed professor of zoology at Halle, and remained there till 1850. During the Revolution of 1848, Burmeister took part in the political strife, and was elected as a delegate to the First Chamber from Liegnitz. His health was injured by his labors in this position, so that he resigned his professorship and sought relief in a voyage to Brazil, where he spent more than a year. After his return he visited Italy, and in 1856 he sailed again to South America, where he spent four years in the Argentine provinces. He then resumed his place as professor at Halle, but in 1861 was called to take charge of the public museum in Buenos Ayres, upon which duty he entered in February, 1862. Under his direction this museum has obtained a high place in the estimation of the scientific world. This was abundantly testified in December, 1879, on the celebration of the fiftieth anniversary of Burmeister's admission to the degree of doctor of philosophy, when com-

plimentary letters from European and American scientific societies and academies were presented to the veteran director. Burmeister's earliest publications were text-books on the natural sciences, and some of these have passed through several editions, as the *Grundriss der Naturgeschichte* and *Geschichte der Schöpfung*. He afterwards published accounts of his travels in South America and works on zoology and physical geography. Among these are—*Systematische Uebersicht der Thiere Brasiliens* (Berlin, 1856); *Anales del Museo Público de Buenos Aires* (1864–74); *Description physique de la République Argentine* (Paris, 1876). His contributions to scientific journals have been numerous and valuable, and his name has been given to a large number of species of animals discovered or described by him. He has been made a member of many American and European scientific societies.

BURNAND, Francis Cowley, an English humorist, editor of *Punch*, was born in 1837. He was educated at Eton and Trinity College, Cambridge, and was admitted to the bar in 1862. His ability as a humorous writer has been displayed in a large number of pieces for the stage, among which the burlesque of *Ixion* was the first to achieve success. His travesty of Douglas Jerrold's *Black-eyed Susan* had a remarkable run of 400 nights in London. Burnand's genuine humor and happy knack of twisting words and notions made him a very acceptable contributor to *Punch*, which for some time had been depending on its draughtsmen to sustain its reputation. He soon became its chief writer, and after the death of "Tom" Taylor in 1880, Burnand by the best of right succeeded to the charge of that important censor of British follies and foibles social and political. Even the fact that he had been for some years a sincere Roman Catholic did not prevent the publishers from securing his valuable aid, though twenty years before Richard Doyle had been constrained to leave *Punch* on account of its hostility to his faith. From the pages of that journal in succeeding years several volumes have been gathered which attest Burnand as a worthy successor of Hood. Some of his books are novels sparkling with puns and full of rollicking humor; others are burlesques of various popular novels, books of travel, etc. The most noted is *Happy Thoughts* (1870), which was followed by *More Happy Thoughts* (1871) and *Happy Thought Hall* (1872). Another novel is *My Time, and What I've Done with It* (1874). The burlesques include *A Treble Temptation* (1873); *The Modern Sandford and Merton* (1875); *The Ride to Khiva* (1876); *The Incomplete Angler* (1876); *Strapmore, by Weeder* (1878); *What's the Odds?* (1879); *Gone Wrong* (1881).

BURNETT, Frances Eliza Hodgson, an American novelist, was born in Manchester, England, Nov. 24, 1849. When she was fifteen years old her family removed to Knoxville, Tenn. While yet in her teens she wrote for magazines a number of love-stories, some of which were published in book-form after her later stories had established her reputation. In June, 1872, she made her first contribution to *Scribner's Magazine*, and she has since written regularly for that magazine and its successor, *The Century*. Her most powerful and characteristic work, *That Lass o' Lowrie's*, appeared in 1876. It is a story of a Lancashire mining-town, and shows a thorough acquaintance with its modes of life and a deep sympathy with those engaged in mining. Clearly and strongly is its usual hardening and debasing effect upon character displayed, while in the development of the heroine from a rude pit-girl to a noble type of womanhood we are shown the possibility and means of triumph over surrounding evil. Around this central figure are grouped with artistic skill other characters, well drawn and lifelike, yet subordinate. Throughout the work the author has displayed great dramatic power and a perfect mastery of the Lancashire dialect. The instantaneous and pronounced success of this work caused her to linger in the same field, but her next work, *Haworth's* (1878), though evincing considerable power, is strained and melodramatic. Turning her attention now to the life with which she had become familiar in America, Mrs. Burnett issued *Louisiana* (1880), a story of Western North Carolina. Here she shows again keen insight into character and remarkable power of presenting vigorous thought in a rude dialect. Among her works are *A Fair Barbarian* (1881); *Through One Administration* (1882), and *Little Lord Fauntleroy* (1886), whose success has been phenomenal, both as a novel and in its dramatized form. In September, 1873, she was married to Dr. S. M. Burnett, and since 1877 has resided chiefly at Washington, D. C.

BURR, Aaron (1756–1836), third Vice-President of the United States, son of the Rev. Aaron Burr (1716–1757), and grandson of the theologian Jonathan Edwards, was born at Newark, N. J., Feb. 6, 1756. Both of his parents dying before he was three years old, he and his sister were brought up in the family of their uncle, Hon. Timothy Edwards of Elizabethtown, N. J. Burr was educated at Princeton College, and after graduating in 1772 spent another year there, then resided for some months in Connecticut with Rev. Dr. Joseph Bellamy, his grandfather's theological successor, and afterwards with his brother-in-law, Tappan Reeve, with whom he began to study law. In April, 1775, receiving news of the battle of Lexington, he hastened to the seat of war near Boston and enlisted as a private. His desire for adventures led him to accompany Arnold on the disastrous expedition to Canada by way of the Kennebec River. Though of delicate constitution, his resolute spirit would not permit him to succumb to the hardships of the winter march, and when they reached Canada, Burr was sent ahead to inform Gen. Montgomery, who had marched from New York, of their approach. Having successfully accomplished his dangerous mission, he was placed on Montgomery's staff with the rank of captain. Eager to distinguish himself, he led a forlorn hope in the unsuccessful assault on Quebec, Dec. 30, 1775, and when Montgomery fell endeavored to bring off his body. Burr's gallant conduct procured his promotion to the rank of major, and on his return in May, 1776, Washington invited him to remain at headquarters, then in New York. In a few weeks Burr was dissatisfied with his position, and left to join the staff of Gen. Putnam, a rough but valiant soldier. By his conduct at this time Burr lost for ever the esteem of Washington, and afterwards affected to despise the military ability of the commander-in-chief. For the rest of the year he was actively employed in operations around New York, and in the next July was made lieutenant-colonel, having the actual command of his regiment. He served till November on the banks of the Hudson, then joined the main army, about to go into winter quarters at Valley Forge. At the battle of Monmouth, June 28, 1778, he commanded a brigade, and by his severe labors and exposure incurred an illness from which he slowly recovered. In the winter he displayed skill and courage in guarding the American lines in Westchester county above New York City, and this duty being found too severe for his

strength, he was placed for a short time in command at West Point, but in March, 1779, resigned on account of ill-health. Having resumed the study of law, he was admitted to the bar at Albany in April, 1782. In July of the same year he married Mrs. Theodosia Prevost, the widow of Gen. Augustine Prevost, a British officer.

When the Americans regained possession of New York in Nov., 1783, Burr settled in that city, and, by his skill and talents obtaining extensive practice, was soon living in splendid style at Richmond Hill, a fine mansion in the suburbs. At this time began his professional rivalry with Hamilton, soon to turn into a bitter political strife. Three great and powerful families then divided the political control of the State of New York—the Clintons, the Livingstons, and the Schuylers. Hamilton had by his marriage allied himself with the last, but Burr showed himself desirous of pulling down all three, that he might rise to supreme power on their ruins. In 1784 he was elected a member of the State assembly, and in 1789 was appointed attorney-general of New York. In the great discussion which agitated the State concerning the ratification of the Federal Constitution, he had manifested a contemptuous indifference, but after its adoption he appeared as a candidate of the Anti-Federal party. Around him gathered needy and talented young men who followed his fortunes to make their own, and were sometimes called "Burr's Little Band." By such means his political influence steadily increased, and in 1791 he was chosen United States Senator by the legislature, succeeding Gen. Philip Schuyler, whose aristocratic haughtiness had given offence. When the Senate met, Burr though the youngest member, was made chairman of the committee appointed, according to the custom of the time, to reply to the address of the President. His brilliant talents and charming manners rendered him popular with members of both parties in the Senate, though he always acted with the Republicans, as the Anti-Federalists were now called. Yet the Virginia leaders did not favor him, and when he was strongly recommended for the mission to France, Washington absolutely refused to appoint him.

In 1797 the Federal party seemed to have gained complete control of New York, and Burr, retiring from the national Senate, was obliged to be content with a nomination to the State assembly. Then his peculiar genius for party manipulation was finely displayed, and his adroit management of the campaign regained for his party the position it had lost. Taking advantage of the carelessness of the Federalists in forming their ticket, he secured the nomination of the ablest and most trusted citizens of the State, and shrewdly overcame their respective objections to be candidates. The success at this election assured to his party the great prize of the Presidency in the approaching national contest, and as a reward for his eminent services Burr was placed on the ticket with Jefferson. Both obtained 73 electoral votes, and according to the provision of the Constitution in such emergency it devolved upon the House of Representatives, voting by States, to decide which should be President. Several of Burr's relatives were prominent Federalists, and most of that party in Congress voted for him, though Hamilton used his influence in opposition. Burr kept silence, and seemed willing to take the prize almost within his grasp, even though by so doing he should alienate his own party. After a contest of several days the Federalists of Vermont and Maryland were induced to withhold their votes, and the thirty-sixth ballot showed eight States voting for Jefferson and six for Burr, while two were divided. By his course while the question was in dispute he lost the favor of the Republicans, and by his subsequent action as Vice-President he was considered by the Federalist Senators as ungrateful. Jefferson ignored him in making appointments to office, and in spite of Burr's urgency retained as naval officer in New York a Federalist who was accused of having been a Revolutionary Tory, rather than appoint M. L. Davis, Burr's right-hand man. But in his own State the baffled politician still retained some influence, and being thus forced into opposition announced himself as an independent candidate for the governorship. Most of the Federalists voted for him, but Hamilton was able to prevent his election. Then came the challenge to mortal combat. The ostensible cause was an expression used by Hamilton privately with reference to Burr's unfitness for the office, and though some attempt was made at explanation, the challenger pressed the demand for satisfaction till Hamilton accepted. The duel was fought early on the morning of July 11, 1804, on the west bank of the Hudson, at Weehawken, N. J. Burr, who had practised at a mark for some days previous, took deliberate aim, and Hamilton fell mortally wounded, his pistol being discharged in the air. For ten days after Hamilton's death Burr lingered in New York, and then, finding public opinion becoming more incensed as the duel was publicly discussed, he withdrew to Philadelphia, and thence to Georgia, hoping the breeze would blow over. Meantime, both in New York and in New Jersey efforts were made to have him indicted for murder on the testimony of clergymen who attended Hamilton in his dying hours. When the Senate reassembled in December, Burr was in his place as Vice-President, and afterwards presided at the impeachment of Judge Samuel Chase, who, being accused of making partisan harangues from the bench, narrowly escaped conviction. His strict impartiality at this trial won the approval of the Federalists, and at the close of his term he made an impressive valedictory address and received the usual vote of thanks. Yet he was a ruined man; his house in New York had been sold, but the amount obtained did not suffice to pay his debts, nor could all his property discharge them, and he was therefore liable to imprisonment if he returned.

Homeless and bankrupt, without a hope of retrieving his fortunes in the East, Burr turned to the West, whither adventurers already had begun to resort. The country beyond the Alleghanies was separated from the East by formidable natural barriers, and the inhabitants of the two sections, though of the same origin, were united by but feeble bonds of sentiment. The natural outlet of the West is the Mississippi, but the mouth of this mighty stream, as well as its right bank, had been in the possession of men of other races, who too often showed distrust and hatred of the hardy adventurers settling on the upper part of the stream. During Jefferson's administration the control of the vast province of Louisiana passed from the Spanish to the French, and then by a happy chance to the United States. But some circumstances connected with the first transfer had proved very irritating to the English-speaking settlers, and their feeling of hostility to the Spaniards was not allayed by the second. The emperor Napoleon had purposely left the boundary of the ceded province vaguely defined in the treaty, and a Spanish armed force for a time occupied territory claimed by the United States.

Burr in his first voyage down the Ohio formed the

acquaintance of Harman Blennerhassett at his picturesque home on an island in that river, and afterwards readily secured his co-operation in schemes for mutual aggrandizement. The men of the West, not comprehending that Burr had fallen from power, were easily deluded with vague talk of his influence at home and abroad. Some political followers who still adhered to his fortunes thought he might be sent to Congress from Tennessee, but Burr preferred an independent position at the head of affairs in the West. Among the men of local celebrity whom he visited were two who afterwards became prominent in national affairs—Andrew Jackson and Henry Clay. Both were for a time his partisans, and the latter successfully defended Burr when arrested in Kentucky on a vague charge of treason. With these and others Burr discussed various schemes in which he was to be leader. He purchased 400,000 acres on the Washita River, where he projected a colony. He enlisted volunteers for an expedition against the Spanish dons; to some he spoke more boldly of a vast empire in Mexico, and his daughter Theodosia, who accompanied him in some of his journeys, was regarded as its destined empress. Again, he showed the feasibility of forming an independent government in the Mississippi Valley, and it was afterwards testified that he asserted it would be easy for a few determined men to overthrow the Government at Washington. His real purpose probably included all of these ideas except the last, though he left the details to be determined by events as they occurred. In carrying out his plans he was aided by adventurous young men from the East, as well as the hardy pioneers who had already spent years in the Western forests. He had also a promise of assistance from Gen. James Wilkinson, a veteran of the Revolution, weak and vainglorious, but then the senior officer in the United States army and stationed at New Orleans. A correspondence in cipher was carried on between them, and, though Wilkinson subsequently asserted that he had never given countenance to anything treasonable, the letters indicate that he was an accomplice. Money was advanced by Blennerhassett and others, boats were built at Marietta, Ohio, military stores and provisions were gathered at Blennerhassett's Island, which was made the rendezvous, while Burr travelled through Kentucky and Tennessee summoning volunteers.

The reports from the West alarmed Jefferson, whose strong prejudice against Burr had grown into a bitter hatred. At last, Wilkinson, after balancing the probabilities between his assured position as the commander of the American army and the uncertain result of a campaign under a leader more distinguished in politics than in war, concluded to lay before the President the contents of the last letter which he had received from Burr, declaring that this had opened his eyes to the real meaning of the proposed expedition against the Spaniards. Jefferson immediately issued a proclamation (Nov. 27, 1806) warning the people of the West to withdraw from unlawful enterprises, and commanding all officers to bring the offenders to condign punishment. At his suggestion, Gov. Tiffin of Ohio sent militia who seized the boats and stores at the rendezvous, while Blennerhassett with a few companions escaped down the river, joining Burr at the mouth of the Cumberland. The whole party numbered about sixty or eighty men, and their leader still kept them in ignorance of his ultimate designs; but when he approached Natchez, finding that Wilkinson was now determined to oppose him, the expedition was forthwith disbanded. When he was arrested in Mississippi Territory a grand jury ignored the bill, but he felt a risk in remaining, and with a few comrades attempted to make his way in disguise to Florida. He was recognized, however, at Fort Stoddard in Alabama, and arrested by Capt. Gaines, who sent him under guard to Virginia.

Arriving at Richmond March 26, 1807, he was brought before Chief-Justice Marshall, and after three days' examination was admitted to bail on a charge of misdemeanor. The next session of the United States circuit court, composed of the chief-justice and Judge Cyrus Griffin, opened May 22, but the grand jury waited a month longer to get the testimony of Gen. Wilkinson, and then brought in indictments for treason as well as for misdemeanor against both Burr and Blennerhassett, who had been arrested in Kentucky. The accused were now committed to prison, and the trials began August 3. The prosecuting attorney was George Hay, and among his assistants was the more distinguished William Wirt, whose speech on this occasion is still famous in the annals of American oratory. The defence was conducted by Burr himself, assisted by Edmund Randolph and other able lawyers of Richmond, as well as Luther Martin, a distinguished Federalist of Maryland. Washington Irving, then a young lawyer of twenty-five, who had contributed to a New York paper established by Burr's friends, was also retained for the defence, but took no public part. Jefferson did not remain passive, but by frequent letters from Washington directed the prosecution, laboring to secure Burr's conviction as a vindication of himself. To his vexation, however, the first trial collapsed (Aug. 31) on the ruling of the chief-justice that no overt act of treason had been proved, as is required by the Constitution. The trial for misdemeanor was then spun out till the end of October, and at last a verdict of acquittal was rendered on the ground that the offence charged had taken place in Ohio, outside of the constitutional jurisdiction of the court. Burr was then held to bail for trial in Ohio, but the prosecution never was renewed.

After the acquittal he went to Baltimore, but soon found it prudent to retire from public view. In June, 1808, he sailed to England under an assumed name, and there made vain efforts to secure the aid of European Governments in establishing an empire in Mexico. In April, 1809, he was placed under arrest by the British Government, but soon after was permitted to go to Sweden. After some months of aimless wandering in Sweden, Denmark, and Germany, he finally went to Paris to lay his schemes before Napoleon. But he found it impossible to reach the emperor, and more difficult to leave France than to enter it. After a stay of fifteen months he secured a passport and sailed from Amsterdam, but had hardly got to sea when the vessel was overhauled by a British frigate and carried into Yarmouth. He went immediately to London, where he lived unmolested, but in extreme poverty, for five months. With great difficulty he succeeded in finding a captain willing to take him as a passenger, and finally arrived penniless in Boston early in May, 1812. By selling his copy of Bayle to Harvard College he obtained the means of reaching New York. Here he resumed his profession, shunned by many, oppressed with debt, yet able by his well-known technical skill to secure some practice.

His beautiful and accomplished daughter, Theodosia, whom he had carefully trained with remarkable devotion, had been married in 1800 to Joseph Alston, a wealthy planter of South Carolina, who afterwards

became governor of that State. In June, 1812, her son, an only child, in whom Burr had taken great interest, died, and on December 30 she set sail to the North to meet her father, but the vessel in which she embarked was lost at sea. Thus "separated from mankind," as he once expressed his condition, he lived a solitary, Spartan life, but conversed freely at times about his past adventures. He is said to have been the first to suggest the nomination of his old friend, Gen. Jackson, for the Presidency, with the purpose of breaking down the Virginia domination that had so long prevailed in the Government, and of which he was a conspicuous victim.

To extreme old age he delighted to exercise his powers of fascination on women. At the age of seventy-seven he was privately married to Madame Jumel, a native of New England and the widow of a wealthy planter of San Domingo, who, having escaped the massacre on that island, had become a successful merchant in New York. The widow, having employed Burr as a lawyer, was drawn on to accept him as a husband, but afterwards her determination still to control her property led to their separation. Yet after his first paralytic stroke he was taken at her request to her home, but on recovering resumed his solitary habits. After a second stroke he was taken to the boarding-house of Mrs. Joshua Webb, and in the summer of 1836 was removed to a small hotel at Port Richmond, Staten Island, opposite New York. Here he died, Sept. 14, 1836. His last word was "Madame." Though he had been reduced to extreme poverty, he left a will under which eventually an illegitimate daughter succeeded to some property.

Burr was below medium height, yet well proportioned and of fine personal appearance, with remarkably piercing and brilliant eyes. He was graceful in manner, and possessed fine conversational powers, though always reticent with regard to himself. It is said that while a student at Princeton he was affected by a revival of religion, and asked the advice of the president, Rev. Dr. Witherspoon. The hard-headed Scotchman, not appreciating the character of the youth, warned him to beware of fanaticism, and Burr dismissed the subject from his thoughts. In active life he was a striking exemplar of the maxims of Lord Chesterfield and a signal instance of their practical failure. However attractive he appeared at first, one after another of those brought in contact with him detected the hollowness and sham of his moral character, and henceforth distrusted him, until at last this distrust became universal. Yet at no time was his course changed in consequence of the public estimation. To him war, law, politics, life itself, were games of mingled skill and chance. He played each with the close attention and external indifference of a professional gambler. In each he displayed considerable ability and attained some success, yet in the end miserably failed in all. He bore his losses with the same stoicism he had displayed when at the point of triumph. The most damaging estimate of his moral character, and especially of his relations with women, has been presented by his personal friend and literary executor, Matthew L. Davis, and, though Mr. Parton has palliated some of the charges, enough remains to condemn Burr as an unprincipled libertine.

His great conspiracy, baffled and crushed ere it had clearly displayed its purpose and character, remains still a problem for the historian. Some of its aspects are indicated in the foregoing narrative. The idea of an empire in the New World undoubtedly seemed practicable to Burr, whose ambition was dazzled by the contemporaneous career of Napoleon I. in Europe. The character and intellect of the American were fitted for attempting such a career, though he lacked the genius and the field to attain even such transient success as the French emperor enjoyed. Happily for the United States, by a natural reaction the failure of his attempt established on a firm basis the union of the Atlantic States with those of the Mississippi Valley, and deferred for half a century any serious attempt to divide the country.

A *Life of Aaron Burr* was published by Samuel L. Knapp in 1835, but the principal biographies are the *Memoirs of Aaron Burr, with Selections from his Correspondence* (2 vols., 1837–38), by Matthew L. Davis, who also edited his *Private Correspondence* (1838); and especially *The Life and Times of Aaron Burr*, by James Parton (1st ed. 1858; enlarged ed. 1864). (J. P. L.)

BURRITT, Elihu (1810–1879), an American author and social reformer, was born at New Britain, Conn., Dec. 8, 1810. He received only a common-school education, and at the age of sixteen was apprenticed to a blacksmith. He became expert in the use of tools of all kinds, and having a strong desire for reading, acquired considerable knowledge of English literature. When twenty-one years old he pursued a short course of mathematics, and then resolved to read the ancient languages. By working diligently in the spring and summer he was able to devote to this object the greater part of the winter, which he spent in New Haven in sight of Yale College, though without assistance from it. His success in what he first proposed led him to make further acquisitions, so that he became proficient in reading not only the ancient languages, but also most of those of modern Europe. In order to obtain access to foreign books, he removed to Worcester in 1844, where he used the library of the Antiquarian Society. A letter giving an account of his studies was brought to the notice of Gov. Edward Everett, and by him read at a State convention of teachers. Burritt was thenceforth known as "the learned blacksmith." He also delivered public lectures advocating temperance, the abolition of slavery, and especially the abolition of war. To further these views he established in 1844 a paper called *The Christian Citizen*. He also started what he called "The Olive-Leaf Mission," sending to newspapers a brief printed tract advocating peace, in the hope that it would be inserted in their columns. This mission was highly successful from the first, and after a time a thousand copies were sent out to as many newspapers in all parts of the Union. In June, 1846, he went to Europe, expecting to stay only three months, but he found a new field of labor in trying to establish "The League of Universal Brotherhood." He travelled through Great Britain lecturing on this theme and forming associations. As an outgrowth of this movement, he began in 1847 to advocate ocean penny postage for the promotion of friendly intercourse among nations. The agitation which ensued eventually accomplished its object. During the famine in Ireland, Mr. Burritt visited that country, and by his reports induced many Americans to contribute for the relief of its distress. In 1848, under his guidance, the first International Peace Congress was held at Brussels, Sept. 20. The second was held in Paris the next year, under the presidency of Victor Hugo. Returning to the United States in 1850, Mr. Burritt was received with great enthusiasm, and started on a lecture-tour through the princi-

pal cities. After attending the next Peace Congress at Frankfort-on-the-Main, Aug. 23, 1850, he renewed his labors in England and extended the Olive-Leaf Mission on the continent of Europe. He returned to the United States at various times, and lectured through the country. In 1856, on account of the threatening aspect of the slavery question, he advocated a scheme for compensated emancipation, and organized a company for this purpose; but, though he labored earnestly, the movement was unsuccessful. He was strongly opposed to slavery, but his love of peace and the failure of his plan caused him to look with little favor on the war for the Union. He lived in retirement on his farm at his birthplace until 1863, when he returned to Great Britain to accomplish a long-cherished plan of travelling on foot throughout the country. These travels are well set forth in his two volumes, *From London to John O' Groat's* and *From London to Land's End*. To these he soon added *Walks in the Black Country* (1866). In 1865 he was appointed United States consular agent at Birmingham, and used his official position to promote systematic emigration from the overcrowded districts of England and Scotland to America. Returning to his native place at the close of his term in 1868, he thenceforth lived on his farm, busily engaged in writing, and laboring especially for the welfare of his neighborhood. In 1872 the honorary degree of A. M. was conferred on him by Yale College. He died at New Britain, Conn., March 7, 1879. Besides his books of travels already mentioned, his principal books are *Sparks from the Anvil* (1847, 1864), *Thoughts and Things at Home and Abroad* (1854), *Mission of Great Suffering* (1867), *Chips from Many Blocks* (1878). Charles Northend has edited *The Life and Labors of Elihu Burritt* (1879).

BURROUGHS, JOHN, an American essayist, was born at Roxbury, Delaware co., N. Y., April 3, 1837. After receiving an academical education he began to teach in a common school at the age of seventeen. He married before he was twenty-one, and afterwards removed to New York, where he drifted into journalism. In 1863 he received an appointment in the Treasury Department at Washington, and became chief of the organization division in the bureau of national banks. In 1871 he visited Europe on important business for the Treasury Department, and again in 1882 he spent several months abroad. He has been since 1873 an examiner of the national banks, and this position affords him abundant leisure for his favorite tramps in woods and fields. He has contributed to the leading American magazines, and many of his essays have been collected in book-form. His first separate publication was *Notes on Walt Whitman as Poet and Person* (1867), but his later collections have consisted of observations on the various aspects of nature in America and England. He is a keen and original observer, with a hearty enthusiasm for uncultivated nature, and his racy, idiomatic style tends to create a similar enthusiasm in his readers. The titles of his books are generally taken from the leading essay; they are *Wake-Robin* (1870), *Winter Sunshine* (1873), *Birds and Poets* (1875), *Locusts and Wild Honey* (1878), *Pepacton* (1881), *Fresh Fields* (1884), etc.

BURTON, JOHN HILL, LL.D., D.C.L. (1809–1881), an eminent Scotch historian and essayist, was born at Aberdeen, Aug. 22, 1809. His father, during the apprehension of an invasion of Britain by Napoleon, had gone as a lieutenant in a London volunteer company as far north as Aberdeen, and there married Miss Eliza Paton. His son showed ability by gaining a bursary in Marischal College by competition before he had completed his grammar-school course. The mother from her scanty means helped him through college, and his only recreation was taking long rambles on foot in various parts of Scotland. After completing his classical course he began to study law, and when he determined to enter the higher walks of that profession his mother sold a little house she had built and removed to humble quarters in Edinburgh. Here, besides studying civil law, he attended various classes in the university and commenced his literary career. From early youth he had been fond of writing and had contributed to local periodicals; he now assisted in preparing school-books and various compilations. Though he was admitted to the Scotch bar as an advocate in 1831, he found little employment in his profession, and soon all his time was absorbed in authorship. He wrote for the *Westminster Review*, and afterwards for the *Edinburgh Review*, on law, history, and political economy. His first work of special importance was *The Life and Correspondence of David Hume* (1846) which was followed by the *Lives of Lord Lovat and Duncan Forbes* (1846). He was associated with Dr. John Bowring in editing Jeremy Bentham's literary remains, and published an introductory work called *Benthamiana* (1848). A little practical treatise on *Political and Social Economy* was the work of a few days in 1849, when he was also editor of the *Scotsman*. At this time he suffered a heavy blow in the loss of his wife, with whom he had spent five happy years. Henceforth to a great extent he shunned general society, and devoted himself still more closely to authorship, contributing frequently to *Blackwood's Magazine*. His legal training had fitted him for preparing a *Manual of the Law of Scotland* (1852) and a *Treatise on the Law of Bankruptcy of Scotland* (1852). In the same year appeared his *Narratives from the Criminal Trials of Scotland*, and in the next a more important volume, which eventually proved to be the first instalment of the work on which his fame rests. This was *The History of Scotland from the Revolution to the Extinction of the Last Jacobite Insurrection* (1853). A change now took place in his fortunes; hitherto he had been obliged to maintain himself by literary toil, but being appointed secretary of the prison-board in 1854, he was relieved of this necessity. He removed to a country residence near Edinburgh, where his official work was chiefly carried on, and in the next year he was married to Katharine, daughter of Cosmo Innes, whose house had been a favorite resort since he lost his relish for society. Determining to complete the history of his native land, he returned, after his day's work at his office in town, to spend most of the night in historical research and literary labor. When the principal part of the duty connected with the Scotch prisons was transferred to London, Dr. Burton was retained as manager, with but little change in his work. Steadily his self-imposed labors advanced, and the results were at last seen in the seven volumes of the *History of Scotland from Agricola's Invasion to the Revolution of 1688* (1867–70), while the volume published previously brings the full work down to 1745. As a relief from the serious toil of these fifteen years he published some lighter articles in *Blackwood*, which were afterwards collected in book-form, and may be regarded as most characteristic of the man. They are *The Book-Hunter* and *The Scot Abroad* (1864). In 1867 he was made historiographer royal of Scotland, an honor which was enhanced by being tendered by a Conservative ministry to one who had been a steady Liberal. In 1868 he was appointed to collect for Parliament the annual judicial statistics of

Scotland. As soon as the *History of Scotland* was finished Dr. Burton took up the reign of Queen Anne as a subject interesting in itself and familiar from its connection with his previous studies. In 1878 he was obliged to leave Craighouse, and took Morton, a place two miles farther out of town. Old age was now creeping upon him, and, though his office-work was diminished, his power of steady application, for which he had been noted, declined. His circle of old friends was reduced to Prof. Blackie and Dr. John Brown, both noble representatives of genuine Scottish character. In 1879, Dr. Burton made his last visit to the Continent, where he had been accustomed to spend a few weeks in summer. His *Reign of Queen Anne* appeared in 1880, and then, his work being done, he sold his library, pleading in reply to the remonstrances of his friends that it had been gathered for use, not for show, and that its size prevented his living in a smaller house. He died Aug. 10, 1881, after a brief illness. Throughout life he was noted for energy and persistency, and is said to have been irritable. His chief mental defect was a want of imagination, so that while a keen observer he was unable to enter fully into the feelings of others. His labors as an historian were highly acknowledged at home and abroad. He received the degree of LL.D. from the University of Edinburgh, and that of D. C. L. from the University of Oxford in 1878. Since his death a new edition of his *Book-Hunter* has been published (1882), with a judicious and affectionate memoir by his widow.

BURTON, Richard Francis, a distinguished English explorer and author, was born at Barham House, Hertfordshire, March 19, 1821. He is the son of Lieut.-Col. Joseph N. Burton, and in his youth spent several years in France and Italy. He entered Oxford in 1840, being then destined for the Church, but soon his taste for an adventurous life led him to accept a commission as lieutenant in the Indian army.

In 1844 he went to Sind with his regiment, and was on the staff of Sir Charles J. Napier, who employed him for five years in the Sind canal survey. He had then become well versed in Arabic, Persian, and other Oriental languages, and frequently ventured in the disguise of a dervish among the wild tribes. He also labored as a native among those employed in making the canal, and thus frequently obtained valuable information. After seven years thus spent in hard study and strange adventure besides his professional duties, he returned to England on account of an attack of ophthalmia from overwork. He now ventured into the field of authorship, giving in his first volume, *Goa and the Blue Mountains* (London, 1851), an account of an excursion to the Neilgherry Hills. In the same year he published *Scinde, or, The Unhappy Valley*, and *Sindh, or, The Races that Inhabit the Valley of the Indus*.

In April, 1853, under patronage of the Royal Geographical Society, Burton entered upon the most romantic part of his career. This was an attempt to penetrate Arabia in disguise, so as to study the inner life of the Moslem. His previous training in the Sind, his accurate knowledge of Eastern languages, manners, and religions, and his Arab head and face, abundantly qualified Burton for this enterprise. Such was the perfection of his disguise in every respect that his true character was never suspected, and his *Pilgrimage to Meccah and El-Medinah* (1855) gave the first account of these places published since the time of Burckhardt, who visited them in 1814. Returning to Egypt, he went to Bombay, where he organized an expedition into Somali Land, East Africa, with the special object of visiting Harar, in Moslem Abyssinia. Disguised as an Arab, he succeeded in reaching this city, and returned to Aden with the first authentic account of it, but the expedition, in which he was accompanied by Lieut. (afterwards Capt.) Speke and two other officers, terminated disastrously. The natives at Berberah made a night-attack on the explorers, in which Burton and Speke were severely wounded and another officer was killed. Burton was obliged to return to England, where he published *First Footsteps in East Africa* (1856). He then went to the Crimea, where he was appointed chief of staff to Gen. Beatson and organized the Osmanli irregular cavalry, which, however, on account of the close of the war, was not brought into action. Turning again to Africa, he proposed to explore the lake regions of the centre. Accompanied by his former associate, Capt. Speke, he landed at Zanzibar Dec. 19, 1856, and soon made a preliminary exploration to the regions about Mombas. The two succeeding years were spent in journeys and adventures, described in his *Lake Regions of Equatorial Africa* (1860). This was the first successful attempt to penetrate that country, and in it the foundation was laid for the subsequent labors of Livingstone, Cameron, Stanley, and others. During these explorations Capt. Burton suffered severely from the effects of the climate, and while he was prostrated with fever Capt. Speke pushed on and discovered the large lake since known as the Victoria Nyanza.

In 1862, Burton was appointed consul at Biafra, West Africa, with a jurisdiction of 600 miles in extent. He took up his residence in the island of Fernando Po, 20 miles from the mainland, as a centre for the thorough exploration of the coast from Bathurst, in Gambia to São Paulo de Loanda, in Angola. He ascended the Cameroon Mountains, and in 1863 published *Abeokuta, or, An Exploration of the Cameroon Mountains*. In the same year he went upon the delicate and dangerous mission—occupying three months—to Gelele, king of Dahomey, to prevail upon him to abolish the "customs"—*i. e.*, the annual festival in the autumn during which many human victims were put to death with attendant ceremonies of great barbarity. This journey was chronicled in his *Mission to the King of Dahomey* (1864).

Burton was then transferred to the consulship of Santos in Brazil, which he held for four years, finding abundant opportunity to gratify his love of adventure. His work on the *Highlands of Brazil* (1868) contains full accounts of the gold and diamond districts, as well as of his canoe-voyage of 1500 miles down the river São Francisco. Being ordered to report to the British Government the state of Paraguay, he visited that country, then crossed the Pampas and the Andes to Chili, travelled along the Pacific coast, and finally returned by the Straits of Magellan. On arriving at London in 1868 he was appointed consul at Damascus, where he had great influence with the Arab tribes. He travelled through Syria, and added to his publications a volume on *Unexplored Syria* (1872). In the same year appeared a volume which he had prepared long before, on *Zanzibar: City, Island, and Coast*. His visit to Iceland in the summer of 1872 is recorded in *Ultima Thule*. On his return he found himself appointed consul at Trieste, and held this post till his death, Oct. 30, 1890. While living here he made various journeys. One of these was to Sind, in which he had commenced his adventurous career; another was to North-western Arabia. These furnished the subject of two volumes, *Sind*

Revisited (1877) and *The Gold-Mines of Midian* (1878). His second expedition to Midian, organized under the patronage of the khedive of Egypt brought back great treasures, ethnological, anthropological, and geological, coins, inscriptions, maps, plans, and photographs of thirty-two ruined cities. Another expedition took him to the Gold Coast of West Africa. In his later years besides a biography of Camoens (1882), with a commentary on his great poem, *The Lusiad*, Burton published a literal translation of the *Arabian Nights' Entertainment* (10 vols. 1885–88), which by its grossness offended English taste. His wife edited a less objectionable version. Burton had mastered thirty languages.

BUSCH, JULIUS HERMANN MORITZ, a German author, was born in Dresden in 1821. After studying theology, and then philosophy, at Leipsic, he devoted himself to journalism, became familiar with English literature, and translated several works of Dickens and Thackeray into German. The years from 1848 to 1851 were a turning-point in his life, and directed his attention to the political problems of the period. At that time he held republican convictions, and as the events of 1850 were discouraging in this respect, as well as dampening the hopes of a unification of Germany, he concluded to emigrate to the United States, with a view of settling down as a farmer. He went in 1851, extended his journey through a large part of the Atlantic and Western States, and made a more protracted stay in Ohio and Missouri. As he found himself disappointed in the ideals he had cherished, he returned to his native land in the spring of 1852. In the next year he gave an account of his observations and experiences in a book called *Wanderings between the Hudson and the Mississippi.*

Subsequently he undertook several other extensive journeys; he spent some time in Sleswick-Holstein, to inform himself by his own observation of the condition of the country under Danish rule; between 1856 and 1859 he three times visited the East, inclusive of Egypt and Nubia. The literary outcome of these years of travel were *Schleswig-Holsteinische Briefe* ("Letters on Sleswick-Holstein"), *Bilder aus dem Orient* ("Pictures from the East"), and *Eine Wallfahrt nach Jerusalem: Bilder ohne Heiligenscheine* ("A Pilgrimage to Jerusalem: Pictures without Glories"). In these writings Busch shows himself identified with the realistic school. In his politics he now began to side with the Gotha fraction. After 1856 he contributed, with Gustav Freytag and Julian Schmidt, to the literary and political weekly *Grenzboten*, the editorship of which devolved upon him from 1859 till the outbreak of the Sleswick-Holstein war. In 1864 he entered the service of Duke Frederick von Augustenburg, whose interests he advocated in Kiel by his pen. When, in 1865, he became convinced that he was no longer in his place, as the duke declined to make even the most necessary concessions to the requirements of nationality, he took his leave and returned to Leipsic, his former place of residence, where he resumed the editorship of the *Grenzboten.* Soon afterwards he went, at the call of the Government, to Hanover, where he assisted the civil commissioner Von Hardenberg as manager of the press that represented the policy of the Government. His experience at that time has been recorded in *Das Uebergangsjahr in Hannover* ("The Transition Year of Hanover"). In the fall of 1867 he repaired again to Leipsic, and used his pen in the vindication of the new order of things in Germany. Besides, he wrote (following Lenormant) *Urgeschichte des Orients* ("Earliest History of the East"), and from documents collected in America a *History of the Mormons.* In February, 1870, he received an appointment in the foreign office at Berlin for the end of discussing and advocating in the public press the ideas and aims of the chancellor, with whom he had close relations. He accompanied Bismarck in the French campaign, retained his position after returning with him from Versailles till March, 1873, and continues in connection with the chancellor to the present time. Having again spent two years in Hanover and some time in Leipsic, writing political papers for the *Grenzboten* and some works touching upon the history of culture—viz. *Deutscher Volkshumor* ("Humor of the People in Germany"), *Deutscher Volksglaube* ("German Popular Notions"), *Die gute alte Zeit* ("Good Old Times"), also translations of some writings of Mark Twain, Bret Harte, Aldrich, and Artemus Ward, under the title *Amerikanische Humoristen und Novelisten*—he published in the fall of 1878 a part of his diary kept during the French campaign, under the title *Count Bismarck and his People* (Leipsic, Grunow), after submitting the manuscript to the chancellor and amending it according to his suggestions. It made a great stir everywhere, and ran within six months through five large editions; besides, it appeared in seven translations (two American, one English, one French, one Dutch, one Swedish, one Russian). The general impression was, that the book is based on strict adherence to fact, and exact, minute observation. Soon after the publication of this work Mr. Busch again took up his residence in Berlin, where his free intercourse with the chancellor gave him an opportunity to serve the latter with contributions to the press, which, on account of the important questions they discussed and the authentic source from which they were known to emanate, received general attention. It is no secret that Mr. Busch has completed a diary which covers the whole time of his dealings with Bismarck, and fills up many gaps left in the publication of 1878.

BUSHNELL, a city of McDonough co., Ill., is at the junction of the Quincy branch and the St. Louis division of the Chicago, Burlington, and Quincy Railroad. It is also on the Wabash, St. Louis, and Pacific Railroad. It has three hotels, a national bank, two weekly newspapers, six churches, two schools, and the Western Normal College. The industries comprise a flour-mill, a foundry, a canning-factory, and manufactures of pumps, ploughs, tiles, pottery, bricks, and cigars. It was settled in 1852, and incorporated as a city in 1877. Population, 2324.

BUTCHER-BIRD. See SHRIKE.

BUTLER, the county-seat of Bates co., Mo., is 75 miles S. E. of Kansas City, on a branch of the Missouri Pacific Railroad. It has a court-house, opera-house, four hotels, two national banks, two daily and four weekly newspapers, six churches, eight schools, and an academy. It has a saw-mill, three flour-mills, a woollen-factory, and a carriage-factory. It has a park, and is lighted with the electric light. It was settled about 1850, but being destroyed during the Civil War it was re-settled in 1865. There are coal-mines in the vicinity, and large quantities of coal are shipped daily. Population, chiefly of American birth, 2813.

BUTLER, the county-seat of Butler co., Pa., is on the Conequenessing Creek, 33 miles N. of Pittsburg, with which it is connected by a branch of the Pennsylvania Railroad and by the New York, Pittsburg, and Chicago Railroad. It is also a terminus of the Karns

City and Butler Railroad. It has three banks (one national), seven churches, graded schools, three flour-mills, three planing-mills, woollen-mills, stave-factory, tannery, and glass-works. The town was laid out in 1803. Population, 8715.

BUTLER, BENJAMIN FRANKLIN, an American lawyer, general, and politician, was born at Deerfield, N. H., Nov. 5, 1818. His father, Capt. John Butler, who had served under Gen. Jackson at New Orleans, died while Benjamin was an infant, and his mother soon after removed to Lowell, Mass. He graduated at Waterville College, Maine, in 1838; studied law, and was admitted to the bar at Lowell, Mass., in 1840. He became noted as a criminal lawyer and also for his advocacy of the rights of the working classes. In politics he was an active Democrat, and attended the national conventions of his party from 1844 to 1860. In 1853 he was elected to the Massachusetts legislature, and was a member of the State constitutional convention. In 1859 he was elected to the State senate, and previous to the Civil War he was twice a candidate for the governorship of Massachusetts. In the Democratic national convention at Charleston, S. C., in May, 1860, he unsuccessfully endeavored to secure a simple reaffirmation of the platform adopted at Cincinnati in 1856. He also strongly opposed the nomination of S. A. Douglas as certain to divide the party, and steadily voted for Jefferson Davis as the Presidential nominee. At the adjourned convention held in Baltimore, June 18, he took part in the proceedings until there was a second secession of Southern men on account of the admission of Douglas delegates to the vacant seats. Butler then, with a majority of the Massachusetts delegation, retired, on the ground that there had been "a withdrawal in part of a majority of the States." While he voted for Breckenridge for President, he was earnestly in favor of the preservation of the Union, and forewarned Pres. Buchanan and Gov. Andrew of Massachusetts of the designs of the Southern leaders. He had always taken an active interest in the State militia, and on the outbreak of the Civil War was a brigadier-general. When Pres. Lincoln, on April 15, 1861, issued a call to the States for troops for the defence of Washington, Gen. Butler ordered the regiments of his brigade immediately into active service. On April 16 the Sixth regiment left Boston, and two days later Gen. Butler followed with the Eighth, while two other of his regiments proceeded by sea to Fortress Monroe. Finding the approach to Baltimore obstructed, Gen. Butler passed down the Chesapeake to Annapolis and restored communication with Washington. A few weeks later he quietly took possession of Baltimore, and May 16 was appointed by the President a major-general of volunteers and placed in command of the department of Virginia with headquarters at Fortress Monroe. Here he was at once confronted with the problem of the disposal of the runaway slaves of Secessionists, and solved it by declaring that slaves as property were "contraband of war." In February, 1862, he was placed in command of the military part of the expedition which sailed to Ship Island in order to operate against New Orleans. After Farragut had successfully passed the forts on the Mississippi defending the approach to that city, Gen. Butler took possession of it on May 1, 1862. By his firmness, ingenuity, and administrative ability he preserved order and public health in a city noted for its hostility to the defenders of the Union and its liability to dangerous epidemics. Even his famous "woman order," which was widely misinterpreted and denounced, secured its object by its mere publication. In December, 1862, he was succeeded in command of the department by Gen. N. P. Banks. In November, 1863, Gen. Butler was appointed to the command of the department of Virginia and North Carolina, and formed a plan for the capture of Richmond by operations from the south side of the James. On May 5, 1864, with the Army of the James he occupied City Point and Bermuda Hundred, and intrenched himself there in order to co-operate with the Army of the Potomac, then approaching from the north. But Gen. Beauregard, who was summoned from Charleston, checked his advance, and a few days later most of his troops were transferred to the Army of the Potomac. In the following November he was on duty in New York City suppressing anti-draft riots, and was afterwards sent on an expedition against Fort Fisher in North Carolina, but his attempt to blow up the fort with a ship filled with powder was a failure, and he was soon relieved of his command. Elected to Congress in 1866, he took a prominent part in the measures proposed for the reconstruction of the Southern States, and was urgent for the impeachment of Pres. Johnson. He also advocated the payment of the national bonds in legal tenders whenever gold was not specified in the bond. He continued in Congress till 1878, though diverging from the Republicans on financial and other questions. Then nominated for governor of Massachusetts by an Independent Democratic convention, he was defeated. In November, 1882, he was elected as a Democrat after an exciting campaign, but when renominated in 1883 was defeated. In 1884, as the candidate of the Greenback party for the Presidency, he received 133,825 votes.

BUTLER, ELIZABETH SOUTHERDEN, an English artist, was born in Lausanne, Switzerland, in 1844. Her maiden name was Thompson. She studied at South Kensington. She first exhibited at the Royal Academy in 1873, her picture that year being entitled Missing. The following year she sent to the Royal Academy The Roll-Call. This work was the great success of the exhibition, and established the artist's reputation. It was purchased by the queen. Subsequently she painted The Twenty-eighth Regiment at Quatre-Bras, Balaklava, The Return from Inkerman, The Magnificat, 'Listed for the Connaught Rangers, On Duty, The Scots Grays advancing, Cavalry at a Gallop, and other works mainly describing incidents of military life. Mrs. Butler's works have been extravagantly praised and almost as extravagantly censured. She is an artist of very great ability, and her faults are evidently to a large extent due to a lack of training. Her drawing is faulty and her composition lacks unity, but, on the other hand, her characterization is almost always excellent, and not only does she deal adequately with incident, but as a rule her subjects as wholes are treated with fire and force.

BUTT, ISAAC (1813–1879), an Irish lawyer and politician, the originator of the Home Rule movement, was born at Glenfin, county Donegal, in 1813. His father was the Episcopalian clergyman of that place, and the family claimed descent from the O'Donnells, the ancient Irish chiefs of Tyrconnell. Isaac graduated at Trinity College, Dublin, in 1832 with high classical and mathematical honors, and in 1836 was appointed Whately professor of political economy in that college. While an undergraduate he had assisted in founding

the *Dublin University Magazine*, and was for some time its editor. In 1838 he was called to the bar, and in 1840 appeared before the House of Lords as counsel for the corporation of Dublin against the Irish Corporation Reform Act. As an able and eloquent representative of the Protestant conservative party he was chosen an alderman of Dublin, that he might oppose in the corporation Alderman Daniel O'Connell, then agitating for a repeal of the Union. In 1844 he became queen's counsel, and took a leading part in all the great trials, civil and political, in Ireland for twenty-five years. He appeared in defence of W. Smith O'Brien and others when tried for treason in 1848. His eloquence and conservatism caused him to be invited to England to speak in advocacy of protection, and in May, 1852, he was elected to Parliament from the borough of Harwich, England. In the same year he was elected as a Liberal Conservative from Youghal, Ireland, but during the thirteen years he held this position his opinions gradually changed and he became a supporter of Lord Palmerston. In 1864 he was called to take charge of an important mercantile case in Ireland, and did not return to Parliament. He was next engaged in defence of some Fenian prisoners, and for four years devoted himself disinterestedly and assiduously to the task, in which he was finally successful. His generous labors in their behalf won for him the confidence of the Irish people. The disestablishment of the Irish Church having been effected, a meeting of the representatives of all classes of Irishmen was held in Dublin, May 19, 1870, to consider the needs of their country and their present duty. Mr. Butt's address on this occasion, unanimously endorsed by the assembly, was the foundation of the Home Rule movement. He asked for an Irish Parliament to have the management of its local affairs, while leaving to the imperial Parliament complete control of imperial interests. On this basis he was elected to Parliament from Limerick in 1871, and became the leader of the Home Rule members. The movement spread rapidly among the Irish people, and Nov. 18, 1873, a more effective organization was formed under the name of the Irish Home Rule League. In the following February, though taken by surprise by the sudden dissolution of Parliament, they elected fifty-seven members favorable to Home Rule. Under the leadership of Mr. Butt they presented to the House of Commons schemes of practical legislation for the amelioration of the Irish people. His own programme of Land Reform he summed up in the three Fs—Fixity of Tenure, Fair Rent, and Free Sale. Mr. Butt, however, opposed the policy of obstruction which more ardent Home Rulers were beginning to employ. In 1877 he left Parliament on this account, but returned in the following session, when the dissensions in his party had been somewhat harmonized. On account of failing health he did not resume his place as leader, though he spoke in advocacy of intermediate education and other measures for the benefit of Ireland. He died in Dublin, May 5, 1879. Some of his early contributions to the *Dublin University Magazine* were made under the name of "Edward Stevenson O'Brien," and have been published separately. He afterwards published some lectures on political economy, a *History of the Kingdom of Italy* (1860), various pamphlets on Irish questions, and a *Practical Treatise on the Law of Compensation to Tenants in Ireland* (1871).

BUTTE CITY, the county-seat of Silver Bow co., Mont., is 65 miles S. of Helena and 450 miles N. of Ogden, Utah, on the Utah and Northern Railroad. It has four hotels, three banks (one national), two daily and two weekly newspapers, six churches, and a graded school. The business of the town is directly connected with silver-mining. There are two foundries, two ore-concentrators, and several silver quartz-mills and smelters. The city is on the southern slope of a mountain 5600 feet above the sea-level. A placer-mining camp was established here in 1863, but it afterwards declined until 1875, when quartz-mills were put in operation. In 1876, Butte City was incorporated, and its property is now valued at $4,000,000. Population, 10,701, an increase of over 7000 since 1880.

BUTTERFLIES, NORTH AMERICAN. During the past thirty years the Lepidopterists of America have greatly increased their stores of information respecting the butterflies of this continent. It is now maintained that there is little real identity between the European and North American insect-fauna—that while in some few instances there may be found grounds on which to base an argument in favor of identity, in the large majority of cases no such correspondences exist. Although Boreal and Alpine kinds, such as the strong-flying Vanessans and Coliades, have migrated in high latitudes, yet when all these are duly noted they will be found to be less than one dozen in number.

See Vol. IV. p. 527 Am. ed. (p. 592 Edin. ed.).

Among the districts that are rich in lepidopterous insects are California and the Pacific slope and the regions of the Rocky Mountains. According to Edwards, up to the year 1852 there were 137 known species in the United States and British North America. Within eight years 61 more were added, but since that date at least 311 others have been duly catalogued and described, so that 509 species are now recorded.

The study of their habits, and of the structure, powers, and uses of their various organs, reveals a world of marvels to naturalists. A butterfly may be said to possess something that answers the purpose of a brain; it certainly possesses an eye for colors, and has preferences in perfumes and tints, contacts and flavors.

The mere fact of butterflies being flying creatures points to the fact that their eyes are highly developed, and although they are attracted by bright colors so strongly that on first taking flight they so immediately proceed to extract sweets from flowers that the action appears to be almost automatic, yet there is reason to believe that they possess in some degree a vague sense of conscious action; although, of course, from acting so constantly under the influence of external impressions or stimulants, butterflies do not exercise the same degree of consideration as those insects that rank higher in the psychologic scale, as ants, bees, etc.

In the first stage the caterpillar lives but to eat; in the second, to sleep; in the third, to rise as it were superior to both, and to gratify more refined tastes. The love of butterflies for beautiful colors is seen not only in the selection of particular flowers, but also in the choice of mates. It is easy to see how readily the ancients were led to note in the temporary death or metamorphosis of lepidopterous insects analogies that correspond with beliefs in immortality.

Young birds see the nest in which they were reared, but caterpillars that form nests (including those that use excrement for building purposes, those that are called carpenter caterpillars, and the architectural caterpillars that construct trap-doors, etc.) have had no such opportunity for making observations, and the knowledge they employ seems to be inherited.

Even down to the formation of their societies (for some caterpillars are sociable) their conduct is well reg-

ulated. As regards what may be termed in business language our account with them, it is fair to say that we receive benefits which are not always duly estimated, and suffer losses which are perhaps unduly estimated. They supply us with silk, and eat our woollen stuffs; they aid in the fructification of plants, and yet they destroy vegetation.

"The Salt Marsh caterpillar" (*Spilosoma acrea*), which is a native of New York, Maryland, and Virginia, breeds in June and September. It changes from white to fox color, and in its last skin becomes nearly black. It is very hairy. These caterpillars eat voraciously day and night, travelling in myriads and devouring not only the produce of corn-fields, but coarse and rank weeds. The summer moth comes out of the pupa state in about seventeen days, and the autumnal moth in about thirty-three days. The *Papilio Asterias* is also found here and in Carolina. The *Papilio Philenor*, which is common in North America from New York to Georgia, is well known from its beauty as well as its frequent appearance. The larva feeds upon the *Aristolochia serpentaria*, and the butterfly delights to frequent the blossoms of peach trees. The *Actias luna*, which is found in the above States excepting Georgia, has wings that are chiefly of a beautiful pea-green color. The posterior ones are furnished with two broad tails with the extremities crimped. The *Sphinx Carolina* is found in New York, Maryland, and Virginia. The caterpillar is pale green, with white stripes and a pink tail. Being very destructive in tobacco-plantations, it is systematically destroyed by cultivators. The chrysalis is chestnut-colored. The moth breeds all through the summer, and obtains in some places the name of "mosquito hawk," from the popular error that it preys upon mosquitoes. The *Saturnia promethea* is found in New York, Pennsylvania, Maryland, and Virginia. The caterpillar on being fully developed selects a perfect leaf of sassafras or spice-wood, and attaches it firmly to the branch by winding around it many threads of fine yellowish-brown silk. The caterpillar then draws the edges of the leaves together, and encases itself in a cocoon of fine strong silk, in which it passes the winter in the pupa state hidden and protected; for although the leaf turns from green to brown and is finally swept away, the chrysalis in its cocoon is bound by its silken cords to the tree. Some of these insects, however, retire in May, and the imago appears in June.

Ajax, which is peculiar to the United States, presents attractions to the student, for in this species there is a true polymorphism and also a seasonal polymorphism in both sexes—that is to say, common parents produce offspring of different and distinct types and of both sexes, and great differences exist between their vernal and autumnal broods. Mr. Edwards gives interesting particulars on these and similar points, and states that the Ajax female hovers over the leaves of plants and trees until she finds one suitable. Then, after balancing by the rapid fluttering of her wings, she stands for an instant with legs stretched at full length, perpendicular to the body, and curving down the abdomen till it touches the surface, deposits a single egg, then flies away to return to a second leaf, and so on for consecutive days, leaving but one egg on each leaf. Here other insects attack them. A scarlet spider hardly larger than the eggs punctures and sucks them dry.

There is a strong tendency to seasonal polymorphism in the *Colias Eurytheme* in the lowlands of California that is periodically counteracted, for it has four broods per annum. The *Argynnis Diana* is fond of the purple flowers of the iron-weed. It feeds from eleven o'clock to three, being sensitive to cool air. Edwards says: "The contrast between the two sexes in this species has no parallel among North American butterflies. In the instance of *Papilio Turnus* there are females of two colors, one of which resembles the male in color and markings, and the other (*Glaucus*), while different in color, retains the markings. In *P. Turnus* there are many cases where the two colors are mingled in the same individual, giving them a brown or mottled appearance; but in *Diana* the sexes are absolutely separated in color, and on the upper surface as widely separated in markings. On part of the lower surface there is a resemblance, but any other two species of *Argynnis* that may be selected are nearer each other than are the two sexes of *Diana*."

The *Grapta Comma* is found in the Eastern and Middle States, Canada, Nova Scotia, and British America, and as far west as Illinois.

The rapid and highly ingenious manner in which the fully grown chrysalis strips off its skin and legs, without losing its hold on the wood from which it is suspended, is extremely interesting, although all suspended chrysalids perform similar operations. When completely disengaged it is soft and uncovered, so that the imago may be seen and divided, but speedily a viscous fluid is exuded that hardens and forms a strong protecting covering. In about eleven days it emerges, the wings alone being undeveloped, although complete in miniature. They soon, however, enlarge, and in thirty or forty minutes are dry and strong and ready for use.

In 1880, Baron L. von Reizenstein discovered the larva of *Smerinthus Cablei* feeding on pickerel-weed. This he regards as a link between true Sphingidæ and Bombycidæ. It was night, and the salt marshes near a summer retreat a few miles from New Orleans were illuminated for miles by electric lights when the search thus rewarded was made. This specimen does not really belong to the genus *Smerinthus*, but is clearly distinct. It is of great size and beauty. The fore wings are of pale slate-color with dark or cloudy bands; the hind wings have a white crescent in the middle surrounded by a deep black band, and the remaining surface of the wings is shaded off with brilliant crimson. The under side of the wings is comparatively less vivid, with the exception of a large crimson patch on the primaries. The outer margins of these are deeply notched, and have by degrees lighter and darker tints. The antennæ are very prominent, strongly serrated, and of extraordinary length. The discoverer proceeds to point out that in the United States there are seven different species of the genus or sub-genus *Smerinthus*, which are separated from Sphinges proper—namely, *SS. gemmatus*, *myops*, *juglandis* of the Southern States; *S. Astylus* and *modestus* of the Lake region; *S. excæcatus* of the Eastern States; and *S. ophthalmicus* of California; and that none exceed three and a half inches in breadth, while this measures five inches, and is of another style of coloration.

The *Argynnis Leto* is found in the Yosemite district of California and in Oregon. The sexes in this species are greatly unlike, while throughout the rest of the extensive genus *Argynnis* they resemble each other very closely.

The *Argynnis Nevadensis* belongs to the valleys near Virginia City, Nev., in the warm cañons of the mountains, and by Washoe Lake. The flight is swift; they

rarely alight; the males are pugnacious and chase each other. On account of the irregularity of the surface of the ground and the "sage-brush" it is difficult to take these insects on the wing.

Libythen Bachmani is found east of the Mississippi, distributed in the United States, Europe, Western Asia, Africa, Mauritius, India, and Java, and the Eastern Archipelago. It has palpi so large as to appear as an immense rostrum projecting from the front of the head, which may serve to protect the spiral tongue, yet other genera are without such protection. The males are tetrapod and the females hexapod. They are peaceable, though liberty-loving insects, for they eat leaves very unwillingly in confinement.

The *Saturnia Cecropia* is extremely handsome. The wings are richly colored—orange-brown, buff-color, red-brown, pearl-color, blood-color, white—and the serpentine lines and markings form a beautiful design. The caterpillar feeds on plum trees. It is thick and fleshy and of pale green. The cocoon furnishes silk which may be utilized.

Among the Lepidopterous insects of New York may be mentioned the *Callimorpha Phyllira*, that continues breeding all the summer, the caterpillar feeding on the crosswort, corn, peas, wheat, etc.

Other New York butterflies are *Spilosoma nais*, *Geometra transversata*, *Bupalus catenarius*, *Ceratocampa imperialis*, *Noctua undularis*, *Spilosoma Arge*, *Noctua Nundia*, *Melitæa Phaëthon*, *Melitæa Tharos*, *Catocala Epione*, *Deiopeia bella*, *Nymphalis Artemis*, *Glaucopis Pholus*, *Spilosoma Ægle*, *Sphinx Hylæus*, etc. The *Glaucopis Pholus* is also found in New England, Maryland, and Carolina.

Bibliography of Lepidoptera.—Peale, *Lepidoptera Americana:* Edwards. *Butterflies of North America*, Entomological Society, Philadelphia; Abbott, *Insects of Georgia;* Cramer, *Papillons Exotiques;* Harris, *Insects of Massachusetts;* Lucas, *Papillons Exotiques;* Packard, *Guide to the Study of Insects;* Riley, *American Entomologist;* Say, *American Entomology;* Drury-Westwood, *Exotic Entomology*, 3 vols., London; Cajetan and Felder, Vienna, *Lepidoptera.* (S. A. P.)

BUZZARD (Fr. *busard* or *buse*; Low Lat. *busio* or *buteo*), an inferior kind of hawk, not fitted for sporting purposes like the species of *Falco*, *Astur*, and *Accipiter*, and on that account despised by falconers, being sluggish and very timid. The name is particularly pertinent to the common buzzard of Europe, *Buteo vulgaris*, but is also applied to various other species of the large cosmopolitan genus *Buteo*. These are all large, heavy hawks, without a tooth upon the beak, of comparatively slow flight, subsisting upon the most humble quarry, and even, in some cases, upon carrion. Of the numerous described species, North America possesses nine. The best known is the red-tailed buzzard or hen-hawk, *B. borealis*, and its several varieties, generally distributed in North America; the red-shouldered, *B. lineatus*, and the broad-winged, *B. Pennsylvanicus*, are other common species of the Eastern United States. A Western species, *B. Swainsoni*, is extremely abundant; it is nearest *B. vulgaris* of Europe. The rough-legged buzzards, distinguished from all the foregoing by having the shank feathered to the toes, form a genus apart, *Archibuteo*, of which there are two North American species, *A. lagopus sancti-johannis* and *A. ferrugineus;* the latter a large, handsome, and very distinct species of Western North America, the former a variety of the European *A. lagopus*. All these birds are of economic importance from their good services in the destruction of field-mice. Popularly, the name "buzzard" is misapplied to certain of the Cathartidæ. (E. C.)

See Vol. IV. p. 536 Am. ed. (p. 603 Edin. ed.).

C.

CABANEL, ALEXANDRE, a French painter, was born at Montpellier, Sept. 28, 1823. He was a pupil of Picot, and obtained in 1845 a grand prize, and went to Rome with a pension. Having returned to Paris, he exhibited between 1850 and 1853 a St. John and The Death of Moses. He gained a medal of the first class in 1855, and was chosen a member of the Institute as the successor of Horace Vernet in 1863. Among his works are Mary Magdalen; A Nymph carried off by a Faun (1859); The Birth of Venus (1863); Lucretia and Tarquin (1877); and numerous portraits. He died at Paris, July 23, 1889.

CABLE, GEORGE W., an American author, was born in New Orleans in 1844. His business-career began in 1859, and was interrupted by his enlistment as private in the Confederate army in 1863. At the close of the war he returned to New Orleans and to mercantile life, in which he was closely employed until 1879. He began his literary career about 1869 in connection with the *Picayune*. His first stories appeared in *Scribner's Magazine* and *Appletons' Journal*, and were afterwards collected and published by Scribner in a volume entitled *Old Creole Days*, in 1877. This volume was soon followed by *The Grandissimes*, *Madame Delphine*, and *The History of New Orleans*. In 1879, Mr. Cable withdrew from commercial life with the determination to devote himself entirely to literature. In 1884 he settled at Cambridge, Mass., and continued his literary activity in his chosen field, occasionally lecturing, and also undertaking special religious work in Boston. His recent works include *Dr. Sevier*, *The Creoles of Louisiana*, *The Silent South*, and *Strange True Stories of Louisiana* (1889).

CADILLAC, the county-seat of Wexford co., Mich., is on Clam Lake and on the Grand Rapids and Indiana Railroad, 98 miles N. of Grand Rapids. It has a bank, six hotels, an opera-house, a weekly newspaper, six churches, good schools, and water-works. It carries on a large trade in lumber, has thirteen saw-mills, three planing-mills, and manufactures of machinery and furniture. It was settled in 1871, incorporated as the village of Clam Lake in 1874, and as the city of Cadillac in 1877. Population, 4455.

CAIRD, JOHN, D. D., a pulpit-orator of the Scottish Established Church, was born at Greenock in 1823. He was educated at the University of Glasgow, where he gained several prizes. In 1845 he was ordained as minister of Newton-on-Ayr, from which he removed in the same year to Lady Yester's church in Edinburgh, and in 1850 became pastor at Errol in Perthshire. Here he remained until 1858, when he removed to Glasgow as minister of the Park Church. His fervid eloquence gave him a wide reputation, which was increased by a sermon which he preached before Queen Victoria and

Prince Albert at the parish church of Crathie in 1855. This sermon, called *Religion in Every-day Life*, was subsequently published at the desire of the queen. In 1860 he received the degree of D. D. from the University of Glasgow, and in 1862 was called to the chair of divinity in that institution. In 1873 he was made principal and vice-chancellor of the university. He has published a volume of sermons and many lectures, including one on *The Universal Religion*, delivered in Westminster Abbey November, 1874. In 1880 he published *An Introduction to the Philosophy of Religion*.

CAIRNS, Hugh MacCalmont, Earl, lord high chancellor of Great Britain, was born in December, 1819, the second son of William Cairns of Cultra, county Down, Ireland. He was educated at Trinity College, Dublin, where he took first honors in classics. He was called to the English bar at the Middle Temple in 1844, and soon gained an extensive practice in the courts of equity. In July, 1852, he was elected to Parliament from Belfast, and his ready eloquence soon made him one of the most prominent members on the Conservative side. In 1856 he was appointed queen's counsel and a bencher of Lincoln's Inn. When Lord Derby became prime minister in February, 1858, Mr. Cairns was made solicitor-general, and soon after received the honor of knighthood. He especially distinguished himself in debate, for which his training at the bar had fitted him. He held the position of solicitor-general until June, 1859, when Lord Derby resigned, and when, in 1866, that statesman was again called to form a cabinet, Sir Hugh Cairns was made attorney-general. In October of that year he was appointed a lord justice of appeal, and in February of the following year he was raised to the peerage as Baron Cairns of Garmoyle, county Antrim. In the House of Lords he gave earnest and effective support to Mr. Disraeli's Reform Bill. In February, 1868, he was made lord high chancellor, thus attaining the highest legal position in Great Britain. He held this office till the resignation of Mr. Disraeli's ministry in December, 1868, having in the mean time made several great speeches, but especially one on the Irish Church Suspensory Bill. In consequence of the success of the last he was in the following session of Parliament appointed leader of the opposition in the House of Lords. In February, 1874, when the Conservative party again came into power, Lord Cairns was again appointed lord high chancellor. In September, 1878, he was created Viscount Garmoyle and Earl Cairns. In 1880 the Liberal party triumphed in the elections, and Earl Cairns again retired from office. In 1867 he was elected chancellor of the University of Dublin. His success throughout his career has been due entirely to his great abilities, indomitable energy, and unwearied labors. His eloquence, though effective and brilliant, is lacking in poetic qualities; his speeches are argumentative and logical rather than profound or emotional. His religious character is not less marked than his ability as a lawyer and statesman.

CALAIS, a city of Washington co., Me., is at the head of navigation on St. Croix River, 12 miles above Passamaquoddy Bay, and opposite St. Stephen, N. B., with which it is connected by four bridges. It is 85 miles E. N. E. of Bangor and 70 miles W. of St. John, N. B., with both of which it is connected by steamboat and railway. There is also a short railroad to Princeton, Me. Calais has two hotels, a national bank, a savings bank, an opera-house, two public halls, two weekly newspapers, ten churches, and sixteen school-houses with thirty schools. It has a brass-foundry, two iron-foundries, three machine-shops, seven saw-mills, four planing-mills, a furniture-factory, three grist-mills, a plaster-mill, and granite-works. It was settled in 1779, incorporated in 1809, and chartered as a city in 1850. It is lighted with gas, and is picturesque in appearance. Its property is valued at $2,000,000; its public debt is $100,000, and its yearly expenses are $35,000. Population, 6173.

CALDERON, Philip Hermogenes, an English artist of Spanish descent, was born at Poitiers, France, in May, 1833. He was taken to England in 1846, and his first art-studies were made in London. In 1851 he went to Paris, where he received instruction from Picot. Calderon first exhibited at the Royal Academy in 1857 his picture of that year being entitled Broken Vows. Thereafter he was a regular contributor to the Academy's and other exhibitions of historical and genre compositions and portraits. Among his best and most celebrated works are The Jailer's Daughter (1858), Nevermore, Her Most High, Noble, and Puissant Grace, The Young Lord Hamlet and Yorick (1868), On her Way to the Throne (1871), Day of the Massacre of St. Bartholomew, The Moonlight Serenade, The Queen of the Tournament (1874), Toujours Fidèle (1875), Watchful Eyes (1876), His Reverence (1876), Joan of Arc (1877), Constance, Victory, and La Gloire de Dijon. He received gold medals at Paris in 1867 and 1878, and he was represented at the Centennial Exhibition of 1876 at Philadelphia by three pictures—After the Battle, Desdemona, and The Siesta. At the Vienna Exhibition in 1873 he gained another medal, and in 1878 he was admitted to the Legion of Honor. Among his later works are Andromeda (1886), and Ruth and Naomi (1887). He was made an associate of the Royal Academy in 1864, a member in 1867, and was appointed Keeper of the Academy in 1887. Calderon is a better draughtsman and a better technician generally than most of his contemporaries among English artists. His historical pictures are well-arranged compositions, which tell their stories with a sufficient clearness if not with remarkable force. His best works, however, are representations of sentimental or familiar subjects. He is master of a graceful style, and subjects which are distinctly within the range of his powers he treats charmingly. (W. J. C., JR.)

Seal of California.

CALIFORNIA, a State of the United States, occupying the greater part of that country's coast on the Pacific Ocean, and having climate and productions differing widely from those of most of the other States, is

See Vol. IV. p. 615 Am. ed. (p. 694 Edin. ed.).

described below, especially with relation to the changes and growths of the past five years. The population, by the census of 1880, was 864,694, which, compared with that of 1870, made the following showing:

	Total.	Males.	Females.	Native.	Foreign.
1870	560,247	349,479	210,768	350,416	209,831
1880	864,694	518,176	346,518	571,820	292,874

The first United States census taken in California was that of 1850, but its figures are untrustworthy, the returns having been in part destroyed by fire. It showed a population of 92,597; the census of 1860 showed a population of 379,994. Of the total returns in 1880, 767,181 were whites, 6018 colored, 75,132 Chinese, 86 Japanese, and 16,277 Indians. In 1870 there were were 49,310 Chinese in California. The population of the State by the census of 1890 was 1,204,002.

Gold-mining.—Although the product of the gold-mines has been steadily diminishing for nearly thirty years, this branch of business may justly take precedence in any detailed description of California industries. The following table, showing the annual bullion production from the inception of gold-digging to 1888, affords a comprehensive view of the rise, progress, and partial declension of the business. It is not claimed to be absolutely accurate, but is derived from the best sources attainable:

Year.	Product.	1869	22,000,000
1848	$ 5,000,000	1870	23,000,000
1849	23,000,000	1871	20,000,000
1850	51,000,000	1872	19,000,000
1851	55,000,000	1873	18,000,000
1852	59,000,000	1874	20,000,000
1853	65,000,000	1875	18,000,000
1854	62,000,000	1876	19,000,000
1855	58,000,000	1877	18,200,000
1856	57,000,000	1878	19,000,000
1857	55,000,000	1879	18,200,000
1858	53,000,000	1880	18,000,000
1859	50,000,000	1881	18,000,000
1860	46,000,000	1882	16,800,000
1861	42,000,000	1883	14,120,000
1862	40,000,000	1884	13,600,000
1863	35,000,000	1885	12,700,000
1864	30,000,000	1886	14,725,000
1865	28,000,000	1887	13,400,000
1866	26,000,000	1888	12,750,000
1867	25,000,000		
1868	22,000,000		$1,213,095,000

Although the bullion of California is generally regarded as gold, about 5 per cent. of that turned out of late years has consisted of silver.

In the recent output the gold-crop of California has reached its minimum. Yet for some years those chiefly interested have retained hope of an improvement in this regard. This expectation is based chiefly on the increased attention being paid to vein-mining and the improvements that have been made in every branch of the business, and partly on the adjustment of the difficulties that for several years have existed between the landowners and the hydraulic miners. Some gains, too, it may be hoped, will arise out of the more stable habits of the mining population, the tendency to lower prices all round, wages of labor included, and the further improvements that may be anticipated in machinery, processes, etc.

Gold-mining as now conducted in California is divided into three principal branches—vein, hydraulic, and drift—each distinguished by the character of the deposits mined and the machinery, implements, and methods employed in it. Vein- or quartz-mining, as it is more generally termed, consists in exploiting the ore-bearing lodes or veins by means of shafts, inclines, or tunnels, and removing their contents, which are then finely pulverized under heavy iron stamps, whereby most of the gold is released from its containing matrix, though left mixed up with the same. The resulting mass, called "pulp," is then subjected to a variety of manipulations and processes for extracting the gold it contains, the agency most employed for this purpose being amalgamation with quicksilver.

Of the total gold-product of California, the proportion taken out by each of these several branches of mining is given in a paper recently prepared by Dr. Henry Degroot for the California State mineralogist, and published by authority of the legislature, as follows: Vein-mining, 35 per cent., hydraulic, 30 per cent., and drift, 25 per cent., the remaining 10 per cent. being credited to the various other modes of placer-mining practised in the State. Included in the product of the hydraulic mines is the small amount of gold extracted from the indurated gravel taken from the hydraulic pits and crushed under stamps, this stuff being too hard to be disintegrated with water.

Vein-Mining.—There are in California about 400 quartz-mills, exclusive of nearly an equal number already worn out or which for other reasons have been abandoned. These mills, about one-fourth of which are run by water and the remainder by steam, carry from five to eighty stamps each, the average being about ten. Their cost has varied with size, outfit, etc., expenditure for construction having been at the rate of $1000 per stamp for small, and rather more for large mills, some of the latter, where very complete in their appointments, being equipped with rock-breakers, automatic ore-feeders, amalgamating-pans, concentrators, chlorination-works, etc., having cost as much as $3000 per stamp. The building of this class of mills began in California as early as 1850, the most of those put up for some years having at first, however, been of limited capacity and simple construction. As with every branch of mining for the precious metals, this has been beset with many difficulties, the most formidable at first having been the high prices of labor and supplies and an imperfect knowledge of the business on the part of those who had engaged in it. As a consequence, many of these enterprises failed of success, the mineral districts of California abounding with abandoned mines and dilapidated quartz-mills.

Besides these mills, something like 100 arastras are being run in the State. This machine is capable of working about one ton of ore per day, a little less than the average quantity crushed by each stamp run. The arastra is used for prospecting and where there are only small quantities of rich ore to be worked, the most of these machines being owned and operated by Mexicans, who have been accustomed to use them in their own country.

The expenses attendant on mining and milling the gold-bearing ores of California range from three to fifteen dollars per ton of 2000 pounds, the average being about six dollars. Only where the conditions are unusually favorable does the cost fall as low as three dollars per ton, while it seldom amounts to less than fifteen, where the ores require to be beneficiated by the more expensive methods, or carry so large a percentage of

sulphurets as to render expensive concentration and chlorination necessary, this method of treating the pyritiferous ores having maintained its popularity against the many new plans that from time to time have claimed recognition.

In so far as the crushing service is concerned, California, if not in advance of all other vein-mining countries, is certainly behind none, nor will pan-amalgamation, much practised here, suffer by comparison with the methods elsewhere adopted.

Hydraulic and Drift Mining.—Hydraulic mining consists in the plan of breaking down and disintegrating the banks of auriferous gravel as they stand in place by means of water discharged against the same in large quantity and under great pressure, this gravel being afterwards carried by the released water into sluices furnished with riffles and other appliances for catching and retaining the gold. In drift-mining that portion of the auriferous gravel that is to be handled is reached and removed through shafts or tunnels, only a thin stratum of the richest material lying next the bottom being taken out. The gravel removed on being brought to the surface is washed in sluices, as in hydraulic operations.

Owing to the large quantities of detritus or tailings discharged from the hydraulic mines into the creeks and rivers, much damage has been done to the low-lying lands along and adjacent to these streams. Having vainly protested against the continuance of this practice, the owners of the lands so injured or exposed to injury, associating themselves together, procured injunctions to be issued against many of the hydraulic miners, restraining them from further emptying their débris into these outletting streams. After several years of fruitless litigation the hydraulic miners have, by a judicial decree recently rendered, been required to so impound or otherwise take care of the coarser and more hurtful portions of these slums that they shall no longer make their way into the rivers. Recognizing the justice of this decision, the miners have everywhere commenced the construction of capacious dams below their claims for the retention of this stuff, which end they will probably so far accomplish as to prevent further litigation between the parties to this contest. As both the State and the general Government are interested in preserving the free navigation of such waters as have been partially obstructed by this mining débris, it may reasonably be expected that they will do something towards removing existing impediments to the same, if they do not also aid the miners in their efforts to prevent future injury to the farming lands and the further shoaling of the rivers. These retaining dams will be capacious and expensive structures, some of them having capacity to hold many million cubic yards of tailings and costing as much as $200,000 each. Should the cost of their construction be thrown wholly on the miners, it would impose upon them a heavy burden, as dams of this kind will be required at many different localities.

The legislature of California in 1881 appropriated the sum of $500,000 for building impounding dams on Bear River and the Yuba, the streams most obstructed with tailings, and along which the greatest damage has been done to the farming lands; the quantity of which rendered for the present nearly worthless amounting here to as much as 25,000 or 30,000 acres, of the average value of $40 per acre; the damage to the farming lands in like manner caused elsewhere amounting to at least half as much more. With the money so appropriated a dam was commenced at an eligible point on the main Yuba, and carried nearly to completion, when this act of the legislature was declared unconstitutional by the supreme court of the State, causing work on it to be suspended. Left in an incomplete state, a portion of this structure was afterwards swept away by the high water, and, having never been repaired, its efficiency as a débris-impounder remains (1882) untested.

In the prosecution of hydraulic mining great quantities of water are required, some of the larger companies using as much as 4000 miner's inches for eight or ten months in the year. While the miner's inch of water is a somewhat uncertain quantity, varying slightly in the different districts, it is generally understood to mean the quantity that will escape through a hole 1 inch square in a 2-inch plank, with the water standing 6 inches above the centre of the orifice, and which amounts to 21,000 gallons in twenty-four hours. Measured by this standard, the water-consumption of such companies amounts to 84,000,000 gallons daily, or something like 20,000,000,000 gallons each working season.

For conveying this water from the supplying lakes and rivers to the mines many ditches have been constructed, some of them large, long, and very costly. Of these artificial water-courses there are at present in the mining regions of California about 500, having an aggregate length of nearly 5000 miles. In length these ditches vary from two or three to seventy-five miles, in carrying capacity from 200 to 4000 inches, and in cost from $500 to $3000 per mile. On an average their length may be set down at eight to ten miles, capacity 1000 inches, cost $2000 per mile, reservoirs, dams, flumes, iron conduits, etc., included, some of these appendages having been attended with heavy expenditure. The carrying capacity of a few short ditches in the State exceeds the largest figure above given. The main trunk of the South Yuba Canal Company conveys throughout its entire length 7000 inches of water, this company delivering to the mines supplied by its system of ditches 200,000,000 gallons daily—nearly two-thirds as much water as the city of New York receives through the new Croton aqueduct.

From the foregoing enumeration has been omitted many small ditches tributary to the larger ones, also such as, having served their original purpose of supplying water to diggings since exhausted, have fallen into disuse, with some few that for other reasons have been abandoned; the aggregate cost of these works having amounted to many million dollars.

In the building of these ditches some bold feats of engineering have been displayed, especially in the construction of the trestles for supporting the flumes along them, and in the laying down of iron pipes for the transmission of water across deep gorges, river-valleys, and other depressions, some of these trestles being over 200 feet in height. Instead of trestles for supporting the flumes, these structures have sometimes been suspended midway along the sides of precipitous cliffs over 300 feet high. The Spring Valley Company convey its ditch-water across the west branch of Feather River through an iron pipe in the form of an inverted syphon, which at its point of greatest depression is 900 feet below the ditch-level. Some of the reservoirs built by these hydraulic companies for water-storage are of large size and have cost from $100,000 to $250,000 each.

While hydraulic mining is carried on in the gravel-banks that stand over or outlie the "Dead Rivers" of

the Pliocene age, drift operations are confined to the deep-lying channels of these ancient streams, so inhumed and obliterated by volcanic flows, mountain uplifts, drift and glacier movements, assisted, possibly, by tidal action, ocean surfs, and other active agents of destruction. In the prosecution of this latter branch of mining recourse is had to shafts and tunnels for opening up and removing the auriferous deposits, which always lie on the bottoms of the buried rivers, and generally from 50 to 200 feet below the surface. Some of these tunnels are of great length, as are also many of those driven to bottom, the hydraulic banks that run for furnishing outlets to the grounds of the North Bloomfield Company being 8000 feet long and costing nearly $500,000. The tunnel of the Bald Mountain Drift Company, at Forest City, is a mile long, including length of deposits removed. The drift-tunnels vary in length from 1000 to 2000 feet, and in cost from $10 to $20 per linear foot, their usual dimensions measured transversely being about 4 feet by 7, though many are much larger.

Other Methods of Placer-Mining.—While hydraulic and drift constitute the leading departments of placer-mining, there are still a number of subordinate branches of the business, each characterized by the mechanisms and modes employed in its prosecution or the kind of diggings in which it is carried on. Thus, we have *river-bed mining*, conducted by two methods—wing-damming, whereby the water is excluded from a portion of the river-bed by an embankment carried out from one shore; and fluming, by which plan the whole of the water is diverted from the channel and carried in ditches or flumes along the bank, leaving the river-bed opposite entirely bare. After being so laid bare by either of these methods, the gold-bearing gravel found in the bottom of the river is removed and washed in sluices. Though generally profitable, this style of mining is precarious: the river-bed is apt to be spotted, paying largely in some places and very little in others; the season for operations is short, and sometimes abridged by premature freshets, which sweep away the miner's works just when he is about to commence or when he may be in the midst of his harvest. Almost always these works, consisting of dams, wheels, sluices, derricks, etc., are carried away by the winter floods, necessitating their replacement the next year; therefore, the fortunes of the river-bed miner are, like his diggings, very uneven. The most of the larger operations of this kind have of late years been confined to the Klamath and other northern rivers, the beds of the streams farther south having in former years been so depleted by this method that they have mostly been given up to the Chinese, who, adopting the cheapest plan of wing-damming, manage to make some portions of them pay.

Dry diggings are of two kinds—one, where there is no water for washing or only a scanty supply in the winter; and the other, where the gold is separated from the auriferous earth by winnowing on rawhides or by machines made for the purpose, no water at all being used in these processes. Dry washing, so called, is not much practised in California, though common in Mexico and some other countries where the laborer is content with small, easily-earned wages. *Seam diggings* consist of small but rich veins of gold-bearing quartz so much decomposed that they can be piped out, aided by the pick, and worked somewhat after the manner of hydraulic ground. This class of deposits is not extensive, and occurs in only a few localities.

Silver-Mining.—The silver-mines proper—or rather, it should be said, the argentiferous ore-producing districts—of California lie for the most part east of the Sierra Nevada, in the counties of Alpine, Inyo, and Mono, where they cover a wide scope of territory. Although the business of mining for this metal has been actively prosecuted in the above localities for a good many years, having been liberally backed with capital and having absorbed much labor, it can in no sense be considered a success, this entire trans-Sierra region abounding with deserted towns, abandoned mines, and dismantled reduction-works. The Cerro Gordo mines, Inyo county, yielding lead-silver ores of the smelting variety, were at one time worked with profit, but of late years they have produced but little; nor are any mines in these counties making a large bullion-production at present, though a number are being worked in a small way, there being also several gold-mines in the Bodie district, Mono co., operated with success. The discovery of promising deposits of silver-bearing ore is reported in both Shasta and San Bernardino counties, but at neither point have sufficient developments been made to establish for these deposits a large and unmistakable value.

Quicksilver, Copper, Lead, and Iron.—These are among the metals somewhat extensively mined in California. The making of *quicksilver* commenced at New Almaden as early as 1846, and has, with but little interruption, been continued ever since, the average annual output of these mines having been a little over 20,000 flasks; total product, about 750,000 flasks. During the past twenty years deposits of cinnabar have been found at many other points in the State, the most of them being in Napa, Sonoma, Lake, San Luis Obispo, Fresno, and Trinity counties. About eight years ago this branch of mining, by reason of the numerous finds made at that time and the then prevailing high prices of this metal, received a great impetus, many additional furnaces having been erected and ore-deposits opened up; which led to such an over-production that prices, ruling at $1.37 per pound in 1874, dropped to 50 cents in 1877, since which time they have averaged about 38 cents in San Francisco, the sole receiving and distributing point on the coast. Present indications denote a steady market at about that figure, unless a combination should be effected for restricting the output—a policy that producers have been endeavoring to carry out for several years past, and which, if inaugurated, might be expected to advance prices somewhat, at least for the time being.

While the mass of the cinnabar worked in California does not yield over 1½ per cent. of metal, that from the New Almaden mines, in Santa Clara county, and the Altoona mine, in Trinity county, yields from 60 to 80 per cent. more. The only mines now making any considerable production in the State are the New Almaden, Napa Consolidated, Great Western, Sulphur Banks, and Reddington, each of which produces from 5000 to 15,000 flasks per annum, there being eight or ten small mines besides which turn out yearly a few hundred flasks each. Six years ago there were as many as seventy furnaces, large and small, employed in the production of quicksilver; now there is not one-half that number; those running at present are, however, mostly of large capacity, roasting from twenty to forty tons of ore each per day. The annual California product of this metal for the past five years has been as follows: 1877, 79,336 flasks; 1878, 63,880 flasks; 1879, 73,684 flasks; 1880, 59,926 flasks; 1881, 58,635 flasks; the product for 1882

being estimated at about 5000 flasks less than that of 1881. Of the quicksilver made, about 65 per cent. is exported to foreign countries, the balance being consumed in the State and the mining-regions adjacent. The largest consumers of California quicksilver are China and Mexico, the former taking an average of 17,000 flasks, and the latter 14,000, annually. This metal is also sent in small quantities to Central and South America, New York, Japan, and Australia. For several years the Comstock mines supplied a market for about 1600 flasks of quicksilver monthly. For the past three years the requirement for these mines has been small—a loss that has, however, been more than made up by increased demands in other quarters, the growth of mining in Arizona and other outlying Territories having been attended with a corresponding consumption of this metal.

While *cupriferous ores* of fair quality and in considerable abundance are found at many points in California, the attempts made at utilizing these products have proved generally disappointing, whether directed to effecting reduction on the ground or shipment abroad. Though a good stock of ore and a tolerable market have rendered the business for a time self-sustaining, yet by the speedy exhaustion of available deposits and the fall of prices it has suffered early eclipse, the prosperous career of these enterprises having rarely ever extended beyond two or three years, the most of them being much shorter lived. Leading such a precarious existence, copper-mining has dwindled to small proportions compared with what it was twenty years ago, when the Copperopolis mines, being in "bonanza," were shipping heavily to a remunerative market. Since the decadence of these mines, some fifteen years since, California exports have been much reduced. While the practice has been to send away the better-grade ores, the most of them going to England and Baltimore, those of poorer quality have been reduced to *matte* either at the mines or at works located elsewhere, the largest at Melrose, Alameda co., both smelting and lixiviation being employed in their treatment. Latterly, the most extensive operations in this line have been carried on by the San Francisco Company at Spenceville, Placer co., where it has opened up a large body of medium-grade ore. In reducing this ore it is placed in heaps of a thousand tons or more on layers of wood, which, being fired, ignites the mass, the sulphur in the ore supporting combustion until the entire heap is desulphurized, the process requiring from four to six months. After roasting, the ore is subjected to leaching, the copper being precipitated from the solution by the use of scrap iron. These precipitations, which are then ready for market, assay from 85 to 90 per cent. fine. Some 10,000 tons of ore are reduced at the Spenceville mine annually, producing about 350 tons of precipitates, the most of which find a market at the various refineries. The present annual shipments of copper ores from San Francisco amount to about 2000 tons, the output of the Arizona and Nevada mines, most of that which formerly came to this port for shipment being now sent to Eastern markets by rail.

Lead-mining, as a distinct industry, is not carried on in California, the considerable quantities of this metal heretofore consumed in or shipped from the State being the product of the argentiferous galena brought from Arizona or of the lead-silver bullion made at the Cerro Gordo mines, Inyo co., and the Eureka mines in the State of Nevada, the most of this ore having been smelted and this bullion parted at the Selby Smelting and Refining Works in San Francisco, the lead being run into pigs and the silver sent to the mint. San Francisco receipts of base bullion for 1881 amounted to 4,344,000 pounds—lead, 12,114,000 pounds; total receipts of the former for past five years, 60,000,000 pounds; of the latter, 28,973,000. The lead goes mostly to New York, prices following those of that market. Shipments to that port for 1880 amounted to 9190 tons, value $1,111,953; for 1881, to 7652 tons, value $1,467,442. The home consumption of lead, some 2000 tons, is mostly in the form of shot, balls, sheet lead, and pipe, of which about enough is made to meet local requirements.

Ferruginous ores of various kinds and good quality abound in California, some eligibly situated as regards accessibility, timber, and water, and others quite the reverse. Not, however, until recently has any attempt been made at manufacturing iron in this State, and this notwithstanding the prices of that metal have always been high, the consumption considerable, and prospective requirements great. The chief obstacle in the way of iron-making here has been lack of a suitable mineral coal for the purpose, none being found in the country. There is in the vicinity of most of these deposits an abundance of timber from which charcoal could be burned, but the making of this has generally been considered too expensive. In the early part of 1881 the California Iron Company, having erected smelting-works at Clipper Gap, Placer co., started its furnaces in April of that year, turning out during the next seven months 4250 tons of iron, which was sold in San Francisco at the rate of $28 per ton, being $2 less than ruling rates for the imported article. The product of these works for 1882 is estimated at 10,000 tons, of a quality that will enable it to compete successfully with the best foreign varieties. Imports of iron at San Francisco, mostly Scotch, have for some years past ranged from 10,000 to 17,000 tons.

Chromic iron has for several years past had a place on the list of California exports, there being immense deposits of this ore in different parts of the State. Many of these cannot, however, be made sources of present revenue, long wagon-transportation shutting them out from market. From those more eligibly situated in this respect, enjoying the advantages of railroad or water carriage, from 8000 to 10,000 tons of chromium have been extracted annually and shipped abroad, the larger portion going to Baltimore, and the balance to Scotland. This ore is of good grade, carrying from 50 to 60 per cent. of chromic acid. The prices received in San Francisco were $17 per ton for 50-per cent. ore, a figure that left the shipper but small margin for profit. With a slight advance in price chrome could be shipped from California in great quantities.

Coal, Salt, Sulphur, Borax, and Petroleum.—The only coal-beds yet opened up to any great extent in California are situated on the northerly slope of Mount Diablo, forty miles east from San Francisco, 900 feet above and five miles distant from tide-water. The workable veins, two in number, varying from three to five feet in thickness, supply a fair article of bituminous, non-coking coal. It is a good fuel for domestic uses and the generation of steam, but does not answer for making gas or for smelting purposes. These mines have been actively worked for the past twenty years, furnishing large quantities of fuel for the San Francisco market, the delivery at that point in 1881 amounting to 103,055 tons, about 75 per cent. of the average for the preceding ten years. Small quantities of coal of

similar quality are gotten out at two or three other places in California, the value of the entire product of the State amounting to about $1,000,000 per annum. The imports of coal at San Francisco during the year 1881 were as follows: from Seattle, Washington Territory, 147,418 tons; Coos Bay, Oregon, 21,246 tons; British Columbia, 158,629 tons; Australia, 126,296 tons; Great Britain, 281,313 tons; anthracite, 13,697 tons; Cumberland, 24,982 tons, with a few small lots from Sitka and other places—total receipts for the year amounting to 899,680 tons, being 15 per cent. greater than in any previous year. The receipts and consumption for 1882 promise to be as large as in 1881. Wholesale prices of coal in San Francisco varied during the year 1881 as follows: Australian, $6.25 to $11 per ton; California, $4.50 to $5.50; anthracite, $12 to $18 Seattle, $7 to $10.

Common salt is one of those commodities for which Nature has made ample provision and placed within easy reach, but which Californians still continue to import largely from other countries. Besides the many natural salines found within or just over the boundaries of the State, California, through her long dry seasons, possesses great advantages for producing this article cheaply by means of solar evaporation, which to some extent is employed for that purpose. Between domestic uses, meat-packing, ore-reduction, the curing of fish, hides, etc., California consumes much salt—between 35,000 and 45,000 tons annually. To meet these requirements she imports large quantities from Liverpool; also some from Carmen Island, Lower California The balance is made at home, the principal part of it at the works located on the easterly shore of San Francisco Bay, being produced from sea-water evaporated by solar heat. At that point exist many large lagoons, some of which have at little expense been converted into extensive reservoirs. These being filled in the winter, the water, exposed to the warm and desiccating atmosphere, has all escaped by the month of June, leaving a heavy stratum of impure salt behind. This is a cheap article, selling for $5 or $6 per ton, being used for hide-salting and other coarse curing. When a better article is to be made, the brine, when at 25°, is run off into wooden vats, and the process of evaporation there completed, the result being a salt almost chemically pure. This product, being shovelled into heaps and left long exposed to the air, becomes further purified and whitened, when it is ready for grinding. Salt is made by a similar process at Santa Monica, San Diego, and other points on the southern coast, the quantity turned out from the artificial salines amounting to 25,000 tons per year. The price of salt in San Francisco varies from $5 to $6 per ton for the lower grades, and from $15 to $20 per ton for the better qualities. There are six mills in San Francisco engaged in grinding salt for culinary purposes.

Sulphur is plentiful, there being heavy deposits of this mineral in Lake and Colusa counties, where it has been utilized to some extent, works having been put up there fifteen years ago, and several hundred tons of refined sulphur turned out annually by simple distillation. Latterly, these works have produced but little, being unable to compete with importations, the foreign article, brought mostly from Sicily, being sold at about $45 per ton in San Francisco—a figure that scarcely allows the local producer any profit. Five years ago the Humboldt mines in Nevada came in as a further competing source of supply. Most of the deposits of this mineral on the Pacific coast are rich, containing from 40 to 60 per cent. of sulphur. At the beds in Lake county solfataric action is still going on, depositing sulphur from the vapors and steam issuing from the extensively fissured volcanic rocks.

While *borax*, the biborate of soda, is found at several places in California, only in the locality known as the Slate Range Marsh, San Bernardino co., does it occur in such quantity and under such conditions as to render it of much commercial value. The Riddell Company, operating at this place, has erected there reduction-works with a monthly capacity of 1200 tons. The annual receipts of manufactured borax at San Francisco averaged for 1880 and 1881 a little over 2000 tons, of which about one-half came from salines in the State of Nevada. Nearly the entire product of the coast is exported, two-thirds going to New York, and the remainder to England.

Although *petroleum* is a widely-diffused product in California, occurring in most of the coast counties, workable deposits have been found only at a few points, mostly in Los Angeles and Ventura counties. Notwithstanding much tunnelling and boring have been done, no flowing wells, like those of Pennsylvania, have been developed, the oil obtained from the wells bored being, with few exceptions, raised by pumping. The deepest borings reached have been about 1600 feet; the largest flow obtained, 75 barrels per day—from five to fifteen barrels per day being about the average quantity. Refineries have been erected near the wells, where a good illuminating and a superior lubricating oil is made. Pipe-lines have been constructed to aid in transportation.

Among minor metalliferous and mineral resources of the State are the following, some of which have already been made the objects of mining enterprise, and must ultimately become sources of considerable wealth to the country: Antimony, in heavy deposits at San Emedio, Kern co., and the Stayton mine, San Benito co.—ore carrying from 30 to 50 per cent. of metal. Extensive works were put up at the former place in 1876, but failed of success by reason of too expensive transportation to market, cost of getting in supplies, etc., the mine being situated in a mountainous district and a long way from the railroad. Asphaltum, in immense beds on the ocean-beach near Mount Hoar, Ventura co., whence several thousand tons are annually shipped at little cost to San Francisco, where it is used for roofing, laying down sidewalks, paving streets, etc. Smaller deposits exist elsewhere in the State. Gypsum, over a large area near the line of the Southern Pacific Railroad, Los Angeles co.; value of the deposit not yet proven. This mineral occurs elsewhere in the State, also abundantly in Arizona near the above railroad and not far from the California line. Possessing the property of neutralizing the alkalies, this mineral must eventually come into large requisition in California, where there is so much land impregnated with this salt. Asbestos and isinglass, tolerably abundant and of kinds likely to make them useful in the arts. Kaolin and other clays suitable for making fine pottery, fire-brick, etc. Stanniferous ore *in situ;* also stream tin reported; but not enough of any kind to make these fields important except as encouragements to more careful search after larger deposits of this valuable metal. Mountains of marble of cloudless white or wonderfully variegated hues, the beds so deep and the rock so firm that immense blocks can be readily broken out. Mineral paints and other pigments, representing nearly all the fundamental colors and of well-established

utility. Roofing slates and good building-stone of all kinds. Graphite, manganese, cobalt, platinum, iridium, and tellurium. Hydraulic cement, of which large quantities are made, nearly shutting out the foreign article, once largely imported. Carbonate of soda. Glauberite, found at Borax Lake, the only place where this salt has as yet been recognized on the continent. Diamonds of pure water, but small size, have been found in the auriferous drift of California; also opals at various points, but not of the precious kind. Garnets and like common stones are frequently met with. Thus, it will be seen, California in the domain of minerals has rich endowments, hardly another country in the world possessing this form of wealth in such great variety, large store, and wide distribution.

Agricultural Products and Pursuits.—Rich as California is in minerals and metals, her agricultural resources cover an equally wide range, being at the same time even more diversified, her soil and climate producing much that is common to both the temperate and the semi-tropical zones. In few other countries is such a varied husbandry practicable as here. Covering nearly ten degrees of latitude, California grows and matures the orange, lime, lemon, and banana, together with the hardier fruits and the cereals that thrive equally well in the distant north. Large areas of the great interior valleys are admirably suited for growing both wheat and cotton, while the Colorado bottoms are equally well adapted for the culture of ramie, jute, and sugar-cane. For raising rice there are probably nowhere any better lands than the vast tulé-marshes lying along and at the junction of the Sacramento and the San Joaquin, while for viticulture the soil over a third of the State may be said to be eminently fitted.

The subjoined data, showing production made of certain agricultural staples in the year 1881, may be prefaced with the remark that in this department of industry the tendency in California has ever been in the direction of big operations. The rule is, large farms and large dairies. So, too, the vineyards and orchards are apt to be extensive. The Glenn farm in Colusa county comprises 60,000 acres of land, two-thirds of it constantly under the plough, over 1,000,000 bushels of wheat being sometimes harvested there in a single season. This is all rich agricultural land enclosed and under tillage, there being other and much larger tracts, the property of single individuals, firms, or companies, but the most of these are wholly or chiefly devoted to dairying or to cattle- and sheep-raising. The firm of Lux & Miller owns 228,000 acres of grazing lands. The Beale "Ranch"—the latter a name often given to these large tracts of grazing lands—contains 173,000 acres; the McLaughlin Ranch, 141,000 acres. There is a large number of these estates in California that contain between 40,000 and 80,000 acres of land, there being 453 that exceed 5000 acres, and 148 that contain between 10,000 and 20,000. In some cases the most of this land is mountainous and fit only for pasturage; a large proportion of it, however, is well adapted for grain-raising. According to the U. S. census of 1880, California contains 20,214 farms that comprise from 100 to 500 acres each; 8967, from 50 to 100 acres each; 3475, from 20 to 50 acres each; and 2531 that contain over 1000 acres each. The big vineyards in the State, like the big farms, are numerous. On the Glenn farm over 300 acres have recently been planted to vines, the most of them of the varieties best adapted for making raisins. The vineyard of Stern & Rose, near Los Angeles, covers 735 acres, and contains over 500,000 vines, the most of them in full bearing, planting having been commenced here in 1860. The orange-grove of this firm counts 12,000 trees. The vineyard of the Buena Vista Company, near the old town of Sonoma, contains nearly 500,000 vines, there being many others in the State that contain from 50,000 to 300,000 vines each, the settings usually being at the rate of about 700 vines to the acre. While the dairies of California are seldom of such overgrown proportions as the farms and vineyards, they are still apt to be large compared with the average elsewhere, numbering usually from 25 to 150 cows. On the lands of Shafter & Howard, in Marin county, over 3000 cows are grazed, the entire number being, however, divided up into some thirty-five or forty dairies. Allen & Son, of Green Valley, milk 350 cows; several other dairymen in the State milking half that number. Many cattle-raisers own from 50,000 to 100,000 head of stock, the flocks of the principal wool-growers being nearly as large.

While the California wheat-crop of 1881 amounted to 28,250,000 centals, that of 1882 was estimated at 28,000,000 centals—over 46,500,000 bushels. The average yield of wheat in this State is a little over twenty bushels to the acre, 30 to 50 per cent. less than it formerly was, much of the soil, through long-continued cropping, having become somewhat impoverished, little or no manure being here applied to the fields. But for the large amount of virgin land that is every year being brought under the plough the effects of this impoverishment would be more apparent. Three-fourths of the wheat planted in California is of the Chilian and Australian varieties, balance mostly Mediterranean and Sonoran. California wheat is noted for its many desirable qualities. The berry is apt to be plump, weighing rarely less than 60 pounds to the bushel, usually more—often as much as 63 or 64 pounds. It has much strength, containing a large proportion of gluten. For this reason it absorbs water freely in its preparation for the oven, and is liked by bakers, as it gives weight to the loaf. Owing to its extreme hardness and dryness, it can be stored or shipped in bulk without liability to heat or sweat, hence it is well adapted for long voyages and use in warm climates. These properties also recommend it to millers abroad for mixture with the damp wheat of other countries. As a general thing, California wheat commands higher prices than any other in foreign markets. Home prices reach within a fraction of those ruling on the Atlantic seaboard.

Next to wheat, barley is the cereal most cultivated in California, though proportionately less is raised now than formerly, when it was largely used for horse-feed. At present the bulk of this grain is malted, either at home or in the countries to which it is exported. Being more certain and prolific than wheat, barley is apt to be a profitable crop. The product of the State for 1881 amounted to 1,500,000 centals against 5,000,000 the preceding year. The quantity exported is variable, ranging from 10 to 30 per cent. of the entire crop; principal places of destination, New York, Liverpool, Australia, and British Columbia, with a little to Central America, Mexico, and Japan. Home prices vary from $1 to $1.60 per cental.

California raises comparatively little rye, oats, buckwheat, or Indian corn—not enough, except of corn, for home consumption; oats being imported from Oregon; rye and buckwheat, in the form of flour, from the Atlantic States. Oats are a sure crop and yield well—on an average 30 bushels to the acre. Much of the crop is cut while green for hay. The meal ground from California-

grown oats is inferior to the imported article. Corn can be cultivated to advantage in a few favored localities only, as in the Russian River Valley and on the El Monte, Los Angeles co., the cool nights and summer droughts retarding its growth. The most of the rye produced is grown on the lighter soils and along the foothills of the Sierra Nevada, where it is a tolerably sure but not very prolific crop, yielding only about 15 bushels to the acre. Buckwheat thrives fairly in many parts of the State, but for some not very obvious reason but little is raised. Although no rice, except in an experimental way, has been grown in California, the trials made establish that this grain could be successfully cultivated on the tulé-land of which the State contains so much. That rice-planting has not as yet been undertaken is due to the fact that all needed supplies can be obtained from China and Japan below the cost of home production. The receipts of this commodity at the port of San Francisco are heavy, the large Chinese population in the country subsisting mainly upon it.

Of the more common vegetables, such as potatoes, turnips, beets, carrots, onions, etc., great quantities are raised, these growing readily and with but little care wherever supplied with enough moisture whether from natural or artificial sources. The leguminous plants, requiring less moisture, are easily grown almost everywhere; so also pumpkins and melons do well on rich and loamy soils. While the California potato lacks good qualities, melons are, as a general thing, excellent, though these too, where irrigation is practised, are often watery and of poor flavor. The potato crop of California averages about 800,000 sacks; onions, 75,000 sacks; beans, 230,000 centals, raised mostly in the southern counties. From 10 to 20 per cent. of these several products, and about the same proportion of various other kinds of vegetables, are exported, mostly to British Columbia and the Hawaiian Islands.

The mulberry tree grows rapidly and yields an exuberant foliage. In one year from the planting it affords much suitable food for the young silkworms, and in three years is fit for regular cropping. Several million trees are growing in the State, with additional plantings every year. The production of silkworm eggs is already large, but, being in demand abroad on account of their freedom from disease, many have been sent to France, Italy, and other silk-growing countries, restricting worm-raising and the consequent production of the fibre; of the latter, however, enough is made to supply the two factories engaged in spinning thread and weaving fabrics out of the silk reeled from California cocoons. These establishments employ a total of 150 hands, and work up 30,000 pounds of the raw material annually. Two crops of cocoons are raised here in the course of the season—one in May and the other in July. The insects, being spared the thunderstorms and cold rains of most other countries, prove here vigorous and prolific workers. That hemp and flax could be successfully grown here would be inferred from the fact that a wild species of both is indigenous to the State. Flax is to some extent cultivated, but only for the seed, no use having yet been made of the fibre. Experiments made with jute and ramie hemp establish that these plants could be grown to advantage on any of the moist bottom-lands of the State, the stalks raised being vigorous and heavily coated with a strong fibre. Several mills have been erected in the State for expressing linseed, castor, and other vegetable oils. Cotton-growing, except in an economic view, can no longer be considered a problem in California, small quantities of this article having been raised in the State for the past ten years. In some instances the crop has been profitable, and in others the reverse; all that can be claimed for these pioneer efforts being that they establish the fitness of the soil and climate for the culture of this plant. To ensure a crop irrigation is necessary, unless the planting be on tulé or other naturally moist lands. The hop-vine in California is noted for its rapid growth and great fecundity, the plant reaching maturity in three years, and yielding at the rate of 1500 pounds to the acre. Matured with little rain and cured mostly in the sun, the fruit retains its natural fresh color and is rich in resinous lupuline. The hop is never injured here by mildew, untimely frosts, or the occurrence of rain during the picking and drying season, the fruit being so nearly cured on the vine that brief exposure to moderate artificial heat completes the process. The average crop of California amounts to about 16,000 bales, of which a little over one-half is exported. The culture of tobacco has been tried in California, but not with such results in quality as to lead to its rapid extension. The growing season being long, the yield is large, averaging 3600 pounds of cured chewing and 2000 pounds of cigar-leaf to the acre. The complaint is of "rankness," due probably to the heat and dryness of the summers. Cranberry-culture has been tried, but as yet without profit. Chiccory can be grown, but it is inferior to the imported German article.

For three or four years during the late Civil War, which prevented the export of turpentine and rosin from North Carolina, enough of these articles was made in California for home consumption. At the restoration of peace they were again obtained from North Carolina. Twenty-five or thirty years ago, before ploughing became general, the Coast Range, with some portions of the larger interior valleys, was covered in the season of verdure with wild mustard, standing so tall and thick that a horseman riding through it was completely hidden from view. Considered worse than worthless, as it interfered with ploughing and obstructed the growth of both grass and grain, it became one of the standing plagues of the farmer. After some time, however, the seed began to be ground for table use, and being found a superior condiment, great quantities were gathered. Latterly, it has come to be further utilized for the rich oil it contains, much of which is now expressed, it being by many preferred to the best lard or olive oil. Since the disappearance of the wild plant before extensive and frequent ploughing, it has to some extent been cultivated to meet the demand that has grown up for its seed.

Fruits, Nuts, and Berries.—The capabilities of the State in this department of production are such that many intelligent observers are of opinion that her orchards, gardens, and vineyards will ultimately become sources of greater enrichment than either her mines or her cereal crops. In addition to the great vineyards mentioned, many others nearly as large might be instanced, the total number of grapevines set out in the State, three-fifths of them bearing, being estimated at 80,000,000. It is expected that the product of wine, which of late years has averaged 10,000,000 gallons annually, will be greatly augmented in the immediate future, recent plantings having been very extensive. Of the entire quantity made, a large proportion goes into the cellars for ageing, about 2,000,000 gallons being exported annually, the most of it to the Atlantic States. Besides wine, many raisins and large quanti-

ties of brandy are made from the grapes. Much of the California wine contains too large a percentage of alcohol to suit the taste of most foreigners, but of late years such improvement has been made in the manufacture as to bring many kinds into more general commendation and partially reversed the earlier unfavorable opinions of the connoisseurs.

The apple was among the first of the fruit trees largely cultivated. Few varieties, however, keep well, and but little fruit is made into cider. The native-grown fruit is not, in fact, so solid or well-flavored as that raised in the easterly half of the continent, though the apples produced in the mountainous districts are not noticeably defective in this respect, there being some varieties that keep nearly the year round. The apple trees number several millions in the State; the peach, pear, and apricot count each a still larger number; the orange, lime, lemon, plum, quince, prune, and cherry are not so numerous. Of fruit trees generally it may be said that they grow rapidly and bear abundantly, and much earlier than in most other countries. The fruit, except in localities not adapted to the particular kind raised or where excessive irrigation is practised, is generally good, much of it being noted for its excellence. This class of trees, the vine included, has thus far enjoyed almost entire immunity from the many diseases, insects, and other pests that assail them in most other parts of the world. The olive, fig, citron, and pomegranate are grown, some of them quite extensively. The banana and some other heretofore accounted purely tropical plants have been set out in the southern part of the State, where they mature their fruit with a perfection not expected. On the list of nut-bearing trees we find the almond, madeira, chestnut, butternut, English walnut, and some others—all being grown with a good prospect of success, some with present profit. The hickory and the beech are not among the native nuts of California, these trees refusing to become domiciled in the State. The more lowly peanut, accepting naturalization, thrives with little care, hardly ever failing to produce an abundant crop. Currants and berries of nearly every kind also grow readily, great quantities being raised all over the State. They are a profitable crop, bringing good prices and being long in the market. Strawberries are to be had every month in the year, and are plentiful for four or five months, beginning with April; other berries for about three months, beginning in June. The strawberry and blackberry are hardly equal to those raised in the East; other kinds, currants included, are not surpassed elsewhere. Large shipments of grapes and early green fruits are made eastward by rail every year; immense quantities of fruits and berries are also dried, some for export, but more for home consumption. Much attention is now being given to tree-culture in California, large groves, mostly of the blue gum or eucalyptus, having been set out in the interior valleys and in the coast counties. This tree grows rapidly, reaching in good soils as large a size in seven years as in twelve in most other places. The sugar-beet is planted on quite a large scale in California; also sorghum to a less extent. Both do well in suitable localities, the product of the former in 1881 being set down at nearly 1,500,000 pounds. This vegetable grows here to a large size, and is rich in sugar. Being left in the ground until wanted for milling, it keeps on growing all winter. By this plan the chemical changes that through storage work a considerable loss of the saccharine matter are avoided, also the trouble of a second handling. In a country where the use of sugar is so large it is of economic importance that requirements be met as far as may be from domestic sources of supply. Of the total receipts of raw sugars at the port of San Francisco in 1881, amounting to 115,432,360 pounds, 93,289,184 pounds were consumed on the Pacific coast, being at the rate of more than 50 pounds of refined sugar to every inhabitant of that region. There are three large sugar-refineries in San Francisco, one of unusual capacity; also, works elsewhere in the State for the manufacture of beet-sugar.

Dairying, Stock-raising, Wool-growing, etc.—For several years past the annual make of butter in California has been between 8,000,000 and 9,000,000 pounds, cheese between 4,000,000 and 5,000,000 pounds. The number of milch cows kept in the State is estimated at 50,000, producing about 170 pounds of butter each per year. These cows consist of American and Spanish breeds, so crossed with blood animals that the poorer points of the original stock have mostly disappeared. Dairying has been a profitable business in California, land suitable for carrying it on being cheap, while butter and cheese have always commanded high prices and a ready market, though neither is as good as the article made in the Eastern States and England. Cows here receive no shelter and but little fodder—none except for a short time in the winter or in seasons of extreme drought. At all other times the cows, and often also the work-oxen, are left to feed on the natural grasses, which, though very nutritious, do not, when once eaten off, grow up again the same season; wherefore a large area of ground, from five to ten acres, is required for the subsistence of each cow. The importation of butter and cheese into California, once very large, has for the past ten years nearly ceased, these articles of home production being now exported freely to other countries, mainly to the Hawaiian Islands, China, and Japan.

The number of neat cattle in California does not now exceed 800,000, being one-fourth less than it was twenty years ago. The reason of this is that much land once devoted to the grazing of stock is now cultivated to grain or given up to sheep-raising. Besides, the business of raising cattle for the shambles is not so profitable now as formerly, much beef and many live animals being brought into the State from Nevada by rail, creating a competition that works to the detriment of the California stockmen. But few oxen are used in California, most draught animals consisting of horses and mules, of which there are about 250,000 in the State. The horses are mostly a mixture of American and Spanish, improved by better breeds, there being many pure-blooded animals in the State. Swine-raising, never a popular or very profitable industry in California, has been on the decline for some years past, these animals numbering only about 400,000 in the State, a third less than twenty years ago. There are peculiar difficulties in the way of growing these animals here: the hot, dry summers do not suit their habits, causing also a lack of succulent food, while mast is scanty, and corn, the great swine-food of the Western States, is scarce and dear. Producing comparatively little hog-products, these are largely imported into the State. California being a tolerably good poultry country, domestic fowls of all kinds are raised in large numbers.

The honey-bee, prior to 1853 a stranger in California, has, since its introduction at that time, multiplied and spread amazingly, there being now over 40,000 hives in the State, besides hundreds of swarms that, escaping,

have scattered all over the country. The insect here is very prolific, as well as a great worker and storer, increasing and making honey twice as rapidly as in the Atlantic and Western States. Except in the higher mountains the insects can hardly be said to hibernate at all. They gather and lay up nearly as much in winter as in summer, consuming more of their hoard in the warm, dry weather than at any other time. In this land of sunshine and fruits and flowers the bee works with but little interruption, and is never without food; even on the deserts it finds in the wild sage abundant and acceptable pasturage. For excellence California honey is probably unequalled, and, being so cheap and abundant, no adulteration is practised in putting it up for market. Bee-culture has a great future in this State.

According to the census returns of 1880, California contained then 4,152,849 head of sheep, being 15 per cent. of the entire number in the country, and constituting her the largest sheep-breeding State in the Union. The annual wool-clip of California has for several years past ranged from 43,000,000 to 56,000,000 pounds, of the average value of $8,000,000. The difference in the prices of wool, as of most other staples, between the Atlantic and the Pacific seaboards consists in cost of freights and charges incident to transportation between these two points.

Manufacturing Industries.—The bulk of the manufacturing in California is carried on in and around the city of San Francisco, not much, except in a few lines, such as making lumber, flour, agricultural implements, etc., being done elsewhere in the State. According to the returns of the Census Bureau for 1880, San Francisco stands tenth on the list of manufacturing cities in the United States as regards value of products and aggregate of yearly wages paid, though she heads the list in the average yearly wages paid workmen, which amount to $522, against $481 paid by Pittsburg, the next highest on the list. By the same authority the number of manufacturing establishments in San Francisco is 2860; capital invested, $29,417,246; employés, 26,062; value of raw materials, $44,537,430; value of products, $71,613,385; net earnings on capital invested, less rents, taxes, insurance, etc., $12,480,945. Sugar-refining and the manufacture of beer and malt liquors, amounting annually to $10,000,000 more, are omitted from the above calculation, the leading industries represented therein being as follows:

	Material.	Products.
Meat-packing	$4,511,721	$6,013,602
Boots and shoes	2,187,811	4,141,547
Clothing	2,863,300	4,933,170
Carpentering	1,690,833	3,121,851
Flour, etc	1,999,613	2,310,209
Furniture	683,895	1,280,210
High explosives	680,416	1,565,868
Iron castings	651,823	1,311,743
Leather	1,607,498	3,116,820
Machinery	1,325,444	2,577,760
Printing	1,615,305	2,987,576
Tobacco and cigars	1,929,357	3,728,813
Soap and candles	676,489	886,293
Tin, copper and sheet-iron ware	542,041	949,499
Upholstering	208,032	360,332
Fruits and vegetables	609,000	978,000
Furnishing goods	509,540	744,245

Besides the above-enumerated branches of business, a great variety of minor pursuits and callings are actively carried on in the city, the list below embracing the more important of these: Yearly value of cigar and other boxes made, $600,000; brass castings, $374,000; bread and crackers, $2,070,000; bags other than paper, $1,565,000; gloves, $191,000; dressed furs, $224,400; glass, $103,000; hats and caps, $83,678; ink, $97,000; jewelry, $315,115; looking-glass and picture frames, $281,000; marble-work, $469,646; matches, $198,600; millinery and lace goods, $456,300; painting and paper-hangings, $639,503; perfumery, $61,900; photographing, $298,960; saddles and harness, $400,715; sash, doors, and blinds, $769,030; shirts, $303,000; straw goods, $85,000; trunks, $166,000; watch and clock work, $223,215—the value of these articles aggregating over $9,000,000. Considerable quantities of acids, axle-grease, brooms and brushes, cocoa and chocolate, casks and barrels, fireworks, hose and belting, lead pipe and shot, maccaroni and vermicelli, saws, wooden and willow ware, yeast powders, etc., are also made in the city.

The commerce of San Francisco, already large, is growing rapidly. Over 500 vessels, nearly all large-class, leave that port annually, the grain-fleet alone carrying away 1,000,000 tons of wheat every year. Outgoing ships hardly ever fail to secure freights, loading with grain, wool, wine, lumber, teas, sugars, provisions, ores, minerals, metals, etc., and bringing back coal, iron, petroleum, and general merchandise, the value of imports and exports amounting to over $150,000,000 annually.

Census Statistics of 1880.—The following additional statistics are derived from the census of 1880: There are 52 counties, the largest in population being San Francisco, with 233,959 people, and the smallest Alpine, with 539. The land-area of the State is 155,980 square miles, this being second only to that of Texas (262,290). The total water-surface within the State is 2380 square miles. The largest county, in area, is San Bernardino (containing a great breadth of desert land in the extreme southern section of the State), with 23,000 square miles, it being equal to the united area of Massachusetts, Vermont, and Connecticut. The bodies of water within the State are reported as having the following area in square miles: Clear Lake, 60; Eagle Lake, 42; Grove Lake (partly in Oregon), 201; Honey Lake, 94; Keni and Buena Vista Lake, 44; Little Klamath Lake (partly in Oregon), 73; Middle Lake, 47; Mono Lake, 84; Owen's Lake, 115; Tahoe Lake (partly in Nevada), 135; Tulare Lake, 650; Upper Lake, 61; Wright Lake, 14. Of the total population, 262,583 were males twenty-one years old or over (this being an unusually large proportion, partly due to the fact that the Chinese element is nearly all adult males). Of this number, 135,209 were natives and 127,374 foreign born, while 66,809 (partly native negroes and Indians, but chiefly Chinese) were returned as colored. There were in the State 177,508 families and 161,037 dwellings, the average number of persons per square mile being 5·54, and the average of persons in a family 4·87. The yields of the principal agricultural products were:

Crops.	Acres.	Production, bushels.
Barley	586,340	12,579,561
Buckwheat	1,012	22,307
Indian corn	71,781	1,993,325
Oats	49,947	1,349,271
Rye	20,281	181,681
Wheat	1,832,829	29,017,707
Tobacco	84	73,317 lbs

The numbers of the several kinds of live-stock were as follows (ranch stock not being reported): Horses, 237,710; mules and asses, 28,343; working oxen, 2288; milch cows, 210,078; other cattle, 451,941; sheep, 4,152,349; swine, 603,550. The manufactures of the State made the following exhibit: Number of establishments, 5885; capital employed, $61,243,784; average number of hands employed—males above sixteen years, 38,317, females above fifteen years, 4022, children and youths, 1460; total annual wages paid, $21,070,585; value of materials consumed annually, $72,607,709; annual value of products, $116,227,973. In the particular manufacture of salt there were 25 establishments, producing by solar evaporation of sea- and bay-water, with a capital of $365,650, employing an average of 184 hands, and having an annual product of 878,443 bushels. There were employed in the fisheries 3036 persons, with 853 boats and 46 vessels. The annual product of the several fisheries was as follows: (1) Shore and halibut fisheries, 8,516,000 pounds of fresh fish, valued at $371,746; crabs and shrimps, 2,500,000, valued at $66,358; oysters, mussels, abalones, etc., valued at $128,250; whale oil, 37,135 gallons, valued at $20,210; fish oil, etc., 6400 gallons, valued at $2000; seal-skins, 2000, valued at $10,000; sea-otter skins, 75, valued at $3750; eggs of sea-birds, 120,000, valued at $1500; sea-weed, 250,000 pounds, valued at $200; (2) cod-fishery, 4,721,920 pounds of fresh fish, valued at $196,870; (3) salmon-fishery, 11,340,000 pounds of fresh fish, valued at $181,010; (4) whale-fishery, 116,550 gallons of whale oil, valued at $59,440; 61,000 pounds of whalebone, valued at $122,000; (5) oyster-fishery, 125,000 bushels of oysters, etc., valued at $575,000.

The number of manufacturing establishments in the State was (census of 1880) 5885, with a capital of $61,243,784, employing hands as follows: Males, above sixteen years of age, 38,317; females, above fifteen years, 4022; children and youths, 1460. The total amount of wages annually paid was $21,070,585; the value of materials annually consumed, $72,607,709; and the annual value of products, $116,227,973.

The chief towns and cities had a population as follows: Oakland, 34,555; Los Angeles, 11,183; Sacramento (capital), 21,420; San Francisco, 233,959; Stockton, 10,282; San José, 12,567; Vallejo, 5987; Marysville, 4321. (H. D.)

CALVARY is the name commonly given to the place of the crucifixion of Christ. (The four Evangelists in their narratives of this event all use the word κρανίον, skull—not as a proper name, but as the interpretation of the Hebrew word, *Golgotha;* and in the Vulgate it is uniformly translated *Calvaria.* The word "Calvary," formed from this, is used in the English Authorized Version only in Luke xxiii. 33, while in the other Gospels it is translated "the place of a skull." The Revised Version of 1881 translates the term in Luke as elsewhere, while the Rhemish (or Douay) Version, as might be expected, everywhere uses Calvary as a proper name.) The place was without the walls of Jerusalem, probably on the north-west side, and seems from the manner in which it is mentioned to have been the usual place for the execution of criminals. The name may indicate that it was a hillock, bald and skull-like, but nothing else in the original shows that it was a mount, although the expression *monticulus* was applied to it in the fourth century; and this belief has since prevailed throughout Christendom. Early ecclesiastical historians assert that the empress Helena, A. D. 326, found the exact spot of the crucifixion, and caused the Church of the Holy Sepulchre to be so built as to include Calvary. This church is within the modern city, but its site was outside the walls in the time of Christ. The manifest improbability that the place of the crucifixion and the tomb of Joseph of Arimathea should be so near to each other has caused many modern investigators, Catholic as well as Protestant, to deny the correctness of the tradition, and the question of locality is not yet fully decided. Mr. J. Fergusson, a distinguished architect, in his *Essay on the Ancient Topography of Jerusalem* maintains that the present Church of the Holy Sepulchre has been built since the Crusades, and that the Mosque of Omar, called by the Mohammedans "The Dome of the Rock," is the church erected by the empress Helena. Lieut. Conder, a more recent explorer, inclines to place Calvary outside the modern walls at the grotto of Jeremiah.

The name "Calvary" is also given in Roman Catholic countries to hills on which crosses are raised, that pilgrimages may be made to them during Holy Week. The most famous of these was at Mont Valérien, near Saint-Cloud, which was a favorite resort for pilgrims from Paris in the seventeenth century, until, on account of increasing disorder, the practice of this pilgrimage was forbidden by the archbishop in 1697. The religious order of the "Priests of Calvary," connected with this place, continued till the French Revolution.

CALVERT, the largest town in Robertson co., Texas, is on the Houston and Central Texas Railroad, 6 miles E. of the Brazos River and 120 miles N. of Houston. It has a bank, a weekly newspaper, eight churches, an academy, and other schools. Calvert ships 20,000 bales of cotton annually. Population, 2280.

CALVERT, CECIL or CÆCILIUS, SECOND LORD BALTIMORE, a son of the first baron of that title, was born about 1603, and succeeded to the titles of his father in 1632. He at once determined to carry out his father's design for the colonization of Maryland. For this purpose he fitted out two vessels, the Ark and the Dove, and collected a body of 200 English Cavaliers, largely Catholics of fortune and family. The expedition sailed from the Isle of Wight on Nov. 22, 1633, under the command of Leonard Calvert (1606–1617), whom his brother, the lord proprietary, had appointed governor of Maryland. The leader of the new colony was only twenty-six years old, but he united in a remarkable degree a daring spirit with the wisdom of age. The voyage was prosperous, and on Feb. 24, 1634, the vessels entered Chesapeake Bay. The colonists were kindly received at Jamestown by the governor of Virginia, who entertained them several days. On March 3 they sailed up the Chesapeake, and spent three weeks in exploring the rivers of Maryland. On March 25 they landed, planted the cross, and took possession of the country "for our Saviour and for our sovereign lord the king of England." The Indians were conciliated by the peaceful behavior of the colonists, and a treaty was formed between them. Gov. Calvert purchased from the Indians all the land for the new settlement, and Maryland is one of the few States whose early history was not stained with the blood of the natives. The first settlement was made at St. Mary's, on the Potomac, and it is simple justice to say that this little spot by the Chesapeake was the only home which religious liberty then had in the whole world. The liberality of the government to persons of all Christian sects induced emigration not only from England and the neighboring colonies, but also from Scotland, Ireland, Wales, Sweden, France, and Germany. In 1642, Gov. Calvert visited England

to consult with his brother about the affairs of the colony. Lord Baltimore had adhered to the royal cause, and joined Charles I. at Oxford after the Parliamentary party had established its power in London. After the execution of the king and the establishment of the Commonwealth, Lord Baltimore submitted to the government of Cromwell. When Gov. Calvert returned to Maryland in 1644, he found the colony divided into two factions, as in the mother-country. Clayborne, the treasurer of Virginia, who had years before established a trading-post on Kent Island, within the limits of the Maryland grant, raised a band of desperate men, and, with the aid of Capt. Richard Ingle, obtained complete possession of the province, and held it for two years, during which time they plundered the people without mercy. Gov. Calvert took refuge in Virginia during the usurpation of Clayborne, and began to collect a force for the subjugation of the outlaws. In April, 1646, at the head of a small force, he crossed the Potomac, surprised the enemy, and after an almost bloodless victory regained possession of the government and restored peace to the distracted colony. On April 16, 1647, he issued a proclamation granting pardon to all who had been engaged in the late rebellion, and on the 9th of June of the same year he died at St. Mary's. Cæcilius Calvert survived his brother twenty-eight years, and died on Nov. 19, 1675. He spent £40,000 out of his private fortune during the first two years of the colonization of Maryland in transporting settlers, stores, and provisions to the new province. He married Anna, daughter of the earl of Arundel, a Catholic nobleman.

CALVERT, CHARLES, the third Lord Baltimore, was a son of Cæcilius. He had been appointed governor of Maryland in 1662, and resided several years in the province, administering the affairs of the colony with justice and ability during a period of great danger. He married, in Maryland, Jane, the widow of Henry Sewall, and lived for three years at Mattapanny-Sewall, near the mouth of the Patuxent River. After the death of his father he visited England, but returned to the province in 1680. During the next three or four years he held several conferences with William Penn in order to arrange the disputed boundary of Maryland and Pennsylvania, but they failed to arrive at any satisfactory settlement; nor was the dispute finally arranged till the year 1760, when Frederick, Lord Baltimore, and Richard and John Penn signed terms of agreement. Until 1684 the lord proprietary, Charles, Lord Baltimore, governed the province in person, but in that year he left Maryland, never to see it again. He died on Feb. 20, 1714, at the age of eighty-four. He was succeeded in the title and estate by his son, BENEDICT LEONARD, who survived his father only one year. Benedict's son, CHARLES, the fifth Lord Baltimore, held the title for thirty-six years, during which time the population of Maryland rapidly increased and the colony enjoyed prosperity. Several new counties were formed and the city of Baltimore was laid out. The fifth Lord Baltimore died in 1751, and was succeeded by his son FREDERICK, the last Lord Baltimore. He was a man of pleasure, a fashionable young nobleman of the time of George II. Occasionally, however, Frederick aroused himself from his pursuit of pleasure and attempted something more worthy of his birth. In 1767 he published a *Tour to the East*, of which Horace Walpole said, "His bills on the road for post-horses would deserve as much to be printed. His book proves a well-known truth—that a man may travel without observation and be an author without ideas." Two years later he published *Gaudia Poetica*, a volume of prose and poetry, "very scarce and very stupid." In 1771 he published another book, *Cœlestes et Inferi*, and the same year he died, "a worn-out old man at the age of forty." With Frederick the title of Lord Baltimore became extinct. He bequeathed the proprietaryship of Maryland to his natural son, Henry Harford, who enjoyed its revenues until the American Revolution placed the State government in the hands of the people. He received from the British Government compensation to the amount of £90,000 as an indemnity for the loss sustained by him by the separation of the colonies from the mother-country.

The present Maryland Calverts are descended from Charles, fifth Lord Baltimore. The descendants of Benedict Calvert, a natural son of Charles, are quite numerous in Maryland. Benedict's daughter married Mrs. Washington's son, John Parke Custis.

CALVERT, GEORGE HENRY, a great-grandson of the fifth Lord Baltimore, was born in Baltimore, Jan. 2, 1803. His mother was a descendant of the painter Rubens, and was a native of Antwerp. After graduating at Harvard in 1823 he studied at the University of Göttingen, and on his return to Maryland became editor of the *Baltimore American*. He has published many works, including translations, dramatic poems, and criticisms. He was the author of the first American work on phrenology (1832), and among his translations are a metrical version (1836) of Schiller's *Don Carlos* and a part of the correspondence between Goethe and Schiller (1845). He also published *Scenes and Thoughts in Europe* (2 vols., 1846, 1852; new edition, 1865). His most popular book is *The Gentleman* (1863), which evinces much curious and out-of-the-way scholarship. All of his writings are marked by a fastidious taste. He has occasionally contributed to the *North American Review*, *Putnam's Monthly*, and other literary periodicals. Since 1843, Mr. Calvert has resided at Newport, R. I. Among his later works are *Ellen, a Poem* (1869), a *Life of Goethe* (1872), and four volumes of poetry, published in 1883.

CAMDEN, the county-seat of Kershaw co., S. C., is on the east bank of the Wateree River, which is navigable for steamboats to this point, 32 miles N. E. of Columbia and 115 miles N.N.W. of Charleston. It is the terminus of the Camden branch of the South Carolina Railroad, and another railroad to the town is now under construction. It has a courthouse, two hotels, two high schools, several academies and common schools, and four churches for whites and two for colored people. Many of the inhabitants are descended from the original Quaker colony, as well as Scotch-Irish settlers of later date and refugees from Virginia after Braddock's defeat in 1755. There is good water-power in the vicinity, and the trade of the town exceeds $1,000,000 annually. It ships 20,000 bales of cotton, besides naval stores and rice. Population, 1780. During the Revolutionary War it was a local centre of military operations, and in the immediate vicinity were fought two important battles between the Americans and the British—one in August, 1780, and the other in April, 1781.

I. In the former the British force was stationed at Camden under Lord Rawdon, who forced every available man into the service, and was joined by his superior, Lord Cornwallis, with reinforcements from Charleston. The cavalry consisted chiefly of Tarleton's legion, the commander of which was already noted for his intrepidity and cold-blooded cruelty. The American general, Lin-

coln, had been relieved from the command of the Southern army after his surrender of Charleston to Sir Henry Clinton, and Gen. Horatio Gates had been appointed, without consulting Washington. His success at Saratoga had so elated him that it was thought proper to caution him against rashness in his new command. The sequel proved that the caution was necessary. He advanced upon Camden with 4500 men, chiefly militia from North Carolina, Maryland, Delaware, and Virginia. He had very little cavalry. His march was unimpeded as far as Clermont, near Rugeley's Mill, a few miles north of Camden. On the 15th of August, having taken unusual precaution, he moved rapidly forward with the intention of surprising the British at Camden, but by a singular coincidence at the same time Cornwallis and Rawdon advanced in the hope of taking him by surprise. Thus the vanguards of the two armies came upon each other about half a mile north of Saunders's Creek, midway between Clermont and Camden. Both fired at the same moment, and the American advance fell back upon the main column in disorder. After some skirmishing there was a pause, and as a retreat was still practicable, while there was great uncertainty as to the result of a battle—the enemy not having been surprised according to Gates's intention—he called a council of officers. It was decided to fight, and the officers returned to their posts. The British army was in line of battle, the right under Lieut.-Col. Webster, and the left under Rawdon. The Americans, recovering from their surprise, also formed their line, the Maryland and Delaware troops under Col. Gist forming the right, the North Carolina militia under Caswell the centre, and the Virginians under Gen. Stevens the left. Both armies waited for the dawn, and with its first beams the battle began. For a time the struggle was nearly equal, but the militia, charged by British bayonets in front and by Tarleton's cavalry in flank, gave way, and the retreat became a rout. Tarleton pursued them, and for two miles the road was strewed with dead and dying, arms, artillery, ammunition, and baggage. The American loss was about 1000; that of the British, 325. The brave Baron de Kalb, a German officer who had been trained in the French service, and had been made a major-general in the American army, fell with eleven wounds. He had displayed great coolness and courage, and his troops were the last to give way. A monument has been erected to his memory at Camden, the corner-stone of which was laid by La Fayette in 1825. A short time after the battle Gen. Gates was relieved by Gen. Greene and brought before a court of inquiry, which acquitted him, but he was not restored to his military command until after the surrender of Cornwallis at Yorktown.

II. The situation of Gen. Greene was one demanding skill, boldness, and fortitude. He was in close proximity to a victorious enemy, and while maintaining his position he succeeded in effectively covering the roads by which supplies and reinforcements must reach him. In March, 1781, he was in North Carolina, and on the 15th he had met Cornwallis in battle near Guilford Court-house, where, after two hours' fighting, the Americans had been repulsed, but had retired in good order, while the British force had been greatly shattered, and was glad to find a resting-place at Wilmington. Greene soon recovering from the effects of the action, was ready for a daring advance into South Carolina to beat up the quarters of Lord Rawdon, who had been left in command at Camden with about 900 men. He began this march on the 6th of April, and on the 19th he encamped at the base of Hobkirk's Hill, where he was less than a mile from Rawdon. The position was a strong one; the country was thickly wooded in his front, while on his left flank and rear was a marsh. On the 25th of April, through an unexplained negligence, the Americans were again surprised. The men were without their accoutrements; some were washing their clothes. The cavalry horses were unsaddled, and Greene and his officers were at breakfast, when Rawdon's advance fell suddenly upon his pickets, less than a quarter of a mile in his front. Fortunately, their fire checked the enemy's advance until the American line could be hastily and somewhat imperfectly formed. The Virginia brigade formed the right, under Gen. Huger. The Maryland brigade, under Cols. Williams and Gunby, the left; Col. Harrison, with the artillery, was in the centre. The reserve consisted of 250 North Carolina militia under Col. Reade. So confident was Greene of success that he had ordered Col. Washington with his cavalry to turn the enemy's left and fall upon his rear. The Americans withstood the first compact charge so well that the enemy wavered. Greene led the Virginia regiments in person, but the Maryland line gave way on the death of one of its leaders, Lieut.-Col. Ford, and it became necessary to retreat: this was done in good order until they reached the north side of Saunders's Creek. The charges of Col. Washington checked the pursuit, and he even succeeded in capturing a number of prisoners, many of whom escaped, but 50 of whom were brought into camp. Again the British were unable to profit by their apparent success, and were obliged to fall back upon their works in Camden. Soon after Rawdon set fire to Camden and retreated. Greene again advanced, capturing several of the enemy's field-forts, and thus his partial defeats were turned into substantial successes. The American loss in this battle was 266; the British, 258. (H. C.)

CAMERON, Simon, an American Senator and politician, was born in Lancaster co., Pa., March 8, 1799. At the age of nine he was left an orphan, and a few years later began to learn the printer's art. In 1820 he became the publisher of the *Pennsylvania Intelligencer* at Doylestown, Pa., and about a year later removed to Harrisburg, where he edited a Democratic paper strongly advocating the claims of Gen. Jackson to the Presidency. He engaged in business in various directions, and acquired a reputation as a shrewd and careful manager. In 1832 he established the bank of Middletown under the State law. Under Gov. Shultz's administration he was adjutant-general. In 1845 he was elected U. S. Senator to fill the vacancy caused by the resignation of James Buchanan, and served till 1849. He supported the annexation of Texas and the war with Mexico. During the agitation of the question of slavery in the Territories he favored the extension of the Missouri compromise line to the Pacific, and when finally this compromise was repealed he became a Republican. In the Chicago convention of 1860 he had the third highest vote on the first ballot for the nomination as President, but his name was afterwards withdrawn. When Pres. Lincoln entered on the duties of his office in March, 1861, he appointed Mr. Cameron Secretary of War. Owing to the disloyalty of many previously connected with that department, its affairs were in a chaotic state at a time when greater demands were made upon it than ever previously in the history of the country. Mr. Cameron labored energetically to secure success to the Union army, and favored the most vigorous prosecution of the war, urging the necessity of striking at slavery as the root of the evil and stronghold

of the enemy. He resigned his position Jan 13, 1862, and was appointed minister to Russia. Within a year he returned to the United States, and in 1864 was a delegate to the Republican convention at Baltimore at which Lincoln was nominated for a second term. In Jan., 1867, he returned to the United States Senate, and was thenceforth conspicuous for his domination of his party in Pennsylvania. Pres. Grant, who at first held aloof from Senator Cameron, was obliged to recognize him as a political leader, and eventually did much to increase his power. In Feb., 1871, when Senator Sumner was removed from the chairmanship of the committee on foreign affairs for personal reasons, Mr. Cameron was chosen to succeed him, and remained in that position till the close of Pres. Grant's administration. He then resigned his Senatorship, securing the election of his son, Mr. J. Donald Cameron, to fill the vacancy.

CAMERON, VERNEY LOVETT, C. B., an English explorer, was born at Radipole, near Weymouth, June 1, 1844, of an ancient Scotch family. He entered the British navy in 1857, and served in the Mediterranean, in the Red Sea, and upon the eastern coast of Africa, where he took part in the Abyssinian campaign as senior lieutenant, and was subsequently engaged in efforts to suppress the slave-trade. During this service he studied the language of the natives of Zanzibar, and was chosen by the Royal Geographical Society of London in 1872 to conduct an expedition for the relief of Livingstone and to aid in his explorations. His journey was the first ever made across Equatorial Africa. (It is described in the article AFRICA, pp. 55, 56.) He returned to England in April, 1876, where he was received with great enthusiasm, was made companion of the Order of the Bath, and received the great gold medal of the Geographical Society, and a similar medal from the Geographical Society of Paris. In February, 1877, he re-entered the English naval service. In 1878 he set out upon a new journey of exploration, through Asia Minor and Persia, his object being to determine whether a railroad might be built from the Mediterranean to India without following down the Euphrates Valley. He has published a translation of Admiral Butakow's *Nouvelles bases de Tactique navale* and an original memoir on *Steam Tactics*. He has described his African journey in an interesting work entitled *Across Africa* (1877), and his later exploration in *Our Future Highway to India* (2 vols., 1880).

CAMPBELL, ALEXANDER (1788–1866), an American theologian and educator, the most prominent leader of the religious denomination called "Disciples of Christ," was born Sept. 12, 1788, in the county of Antrim, Ireland, but his ancestry belonged to the west of Scotland. His mother, Jane Corneigle, was a descendant of French Huguenots. The strict piety and literary culture of the parents secured for the children great advantages, educational, moral, and religious. Alexander, when a boy, had no fondness for study; his special delight was in outdoor sports. But after a few years of hard work on a farm he began to manifest an eager desire for knowledge, and under his father's guidance made rapid progress in his studies. At the age of seventeen he assisted his father as teacher in an academy at Richhill, a school that soon grew into prosperity. In his youth he joined the Anti-Burgher—a branch of the Secession—Church at Ahorey, to which his father ministered. From this time he gave much attention to theological studies, especially to church history. A church of Independents at Richhill was sometimes visited by men of note, such as Rowland Hill, James A. Haldane, and Alexander Carson, who were heard with great interest by the young theologian. In 1808, Alexander embarked with the family, to join his father in the United States. The vessel was wrecked, however, on the Scottish coast, and the voyage to America was postponed. At the time of the shipwreck Alexander resolved that if his life were spared he would devote himself to the Christian ministry, and he went to Glasgow University in preparation for his chosen work. While pursuing his studies he came into association with a class of religious men, such as Rev. Greville Ewing, Robert and James A. Haldane, whose influence over him, joined with that of his previous studies, led him to abandon the communion of the Seceders. In 1809 he migrated to the United States, and, finding that his father had also forsaken that communion and was engaged in an effort to unite Christians as one communion on a purely scriptural basis, he found himself in readiness to join in this work. In Washington co., Pa., he began labor in behalf of this cause, in connection with the "Christian Association of Washington," which published a *Declaration and Address* in 1809 setting forth the objects of the association. It was proposed to establish no new sect, but to persuade Christians to abandon party names and creeds, sectarian usages, and denominational strifes—which at that time were intense and bitter—and associate in Christian fellowship, in the common faith in a divine Lord, with no other terms of religious communion than faith in and obedience to the Lord Jesus Christ. He began to speak publicly in 1810, and delivered 106 sermons within a year. Circumstances leading to the formation of an independent church at Brush Run on the principles avowed by the Christian Association, he was licensed by that Church to preach, and on Jan. 1, 1812, was ordained. Further investigations of the Scriptures led to the conclusion that immersion only is baptism, and that believers are the only scriptural subjects of that ordinance; and on June 12, 1812, Alexander Campbell and his wife, his father and mother, and three others, were baptized by immersion. In 1813 the Brush Run Church entered the Redstone (Baptist) Association, with a proviso, however, that they should be allowed to preach and teach whatever they learned from the Holy Scriptures. Among the Baptists of the West and South, Alexander Campbell, from his superior learning, oratorical power, and ability as an expositor of Scripture, soon occupied an influential position. In 1817 not more than 150 persons could be counted as entering fully into his views of religious reformation. Meanwhile, he had established a seminary at Buffalo Creek (now Bethany, W. Va.), but whenever he could find release from his duties as teacher he was constantly engaged in preaching. He made it a rule to preach without compensation, lest any should charge him with corrupt motives; and this rule he adhered to all his life. Along with these pursuits he carried on large farming operations, himself performing much of the labor. In 1823 he began the publication of a monthly magazine called *The Christian Baptist*, which continued seven years and obtained a large circulation. In this periodical he unfolded his conceptions of New-Testament teaching concerning the gospel, the order and government of the Church, and the terms of Christian fellowship, and reviewed with much pungency what he regarded as the erroneous teachings of the Protestant sects. In 1830 *The Christian Baptist* was succeeded by *The Millen-*

nial Harbinger, a monthly twice as large and much more comprehensive in its range of discussion. Of this magazine he continued to be editor and principal writer until 1863. The growing influence of his teaching is partly shown by the fact that within the seven years ending with 1829 he issued, of his own works, from his little printing-office at Bethany, no less than 46,000 volumes. Among these (in 1826) he published a translation of the New Testament, by George Campbell, Philip Doddridge, and James Macknight, with various emendations and essays of his own. From 1827 to 1830 there was a gradual widening of the breach between the old Baptists and Mr. Campbell's adherents, which finally resulted in a complete separation. The latter refused to be called by any name except "Christians," or "Disciples of Christ." Now, however, they are frequently called "Campbellites." In 1829, Mr. Campbell was elected a delegate to a convention for the amendment of the constitution of the State of Virginia, where he stood in honorable association with such men as ex-Presidents Madison and Monroe and Chief-Justice John Marshall, and bore no inconsiderable part in originating and discussing the leading measures that occupied the attention of the convention. In 1820 he engaged in a discussion with Rev. John Walker on infant baptism, and in 1823 with Rev. W. L. McCalla on the same subject. In 1828 he debated with the celebrated Robert Owen on the evidences of Christianity. In 1837 he held a debate on Roman Catholicism, at Cincinnati, with Bishop Purcell, which lasted seven days. In 1843, at Lexington, Ky., he debated sixteen days with Rev. N. L. Rice, a Presbyterian minister. Besides these oral debates, his written discussions with Jews, Universalists, Unitarians, Spiritualists, Episcopalians, Presbyterians, Methodists, Baptists, and sceptics cover nearly all the questions of religious doctrine and church polity. In all these written discussions he gave both sides fully in his periodicals. But his writings were not limited to controversial topics. He gave much attention to spiritual culture and Christian ethics, and wielded his pen with great power on such questions as slavery, education, capital punishment, and temperance. In 1841 he founded Bethany College, of which he was president from its beginning until his death, and in connection with which he made many valuable contributions to the cause of education. In 1847, during a visit to Great Britain, religious bigotry led to his imprisonment at Glasgow, Scotland, for ten days, when Lord Murray heard the case, declared the warrant illegal, and ordered the discharge of the prisoner. Subsequently, in a suit for false imprisonment, his prosecutor was condemned to pay £2000 sterling damages and fled the country. About this time Mr. Campbell became interested in the American Bible Union, a society for the promotion of faithful translations of the Scriptures, and at a later period engaged earnestly in the work as one of the revisers of the English New Testament. For a period of about forty years extensive travels in nearly all the States, in the Canadas, Great Britain, and Ireland, and constant preaching and teaching, gave Mr. Campbell large influence, and his plea for a complete return to apostolic faith and practice found many sympathizers, but also provoked much opposition. Everywhere he attracted large audiences and established a high reputation as a pulpit orator and public debater, as well as lecturer on literary, philosophical, and educational themes. He was author, in whole or in part, of sixty volumes.

Mr. Campbell was tall, well-formed, and symmetrically developed in all respects. With strong domestic attachments and social affections, his home-life was charming in its simplicity, cheerfulness, and dignity. A constant stream of visitors at the Bethany mansion during a period of half a century called into play his admirable conversational powers and his cordial hospitality. His deep religiousness pervaded the home-circle and made his home a temple of prayer and praise. In all the region round about he was beloved and revered for his unspotted integrity, large benevolence, and unaffected piety. He was twice married, and the father of twelve children. He died at Bethany, W. Va., March 4, 1866. (I. E.)

CAMPBELL, Bartley, an American dramatist, was born in Allegheny City, Pa., Aug. 12, 1843, of Irish parentage. At the age of fourteen he began to write stories and verse for the periodical press. Designed by his widowed mother for the law, he began to study in an office in Pittsburg, but his taste for literature led him to become a reporter for the Pittsburg *Post*. He was afterwards editor of the *Sunday Leader* in the same city, and founded the *Evening Mail*, which he conducted for a year. He then removed to New Orleans, where he started a monthly magazine. In 1871 he wrote his first play, *Through Fire*, the success of which induced him to devote his pen to the stage. A series of successful dramas, including *Fate*, *Peril*, *The Virginians*, was soon produced at Chicago, and some of these have been performed in Great Britain. The production of *My Partner* in New York, Sept. 16, 1879, excited great sensation and caused a great demand for his plays. He became the most popular dramatic writer of the day, and three theatres of the metropolis presented his plays at the same time. His *Galley Slave* has been produced not only in the United States, but in Australia, and has been translated into German. Besides the plays already mentioned, his most successful dramas are *Fairfax*, *My Geraldine*, *Risks*, and *The White Slave*. He is the first American that has confined his work to dramatic authorship, and his career has been remarkably fortunate. The strength of his work lies in its construction, picturesque diction, genial humor, and his thorough mastery of stage-effect.

CANADA. The census in Canada is taken every ten years. The method adopted is the *de-jure* system, which is followed also in the United States. This method has obvious advantages in a country like Canada, where a large percentage of the population is seafaring and apt to be absent at the date of the enumeration, and where the provincial or federal system renders the correct taking of all probable citizens as well as actual residents a matter of moment. The *de-jure* system was adopted in 1871, when the first census of the new confederation was taken; and it was continued, though not without protest, in the taking of the census of 1881, under the direction of Dr. J. C. Taché, a man of retiring habits, but of distinguished merits as a scholar and scientist. The population, by provinces, as ascertained by the census of 1881, compared with the figures of the census of 1871, was as follows:

See Vol. IV. p. 675 Am. ed. (p. 765 Edin. ed.).

	1871.	1881.	Increase.
P. E. Island	94,021	108,891	14,870
Nova Scotia	387,800	440,572	52,770
New Brunswick	285,594	321,233	35,639
Quebec	1,191,516	1,359,027	167,511
Ontario	1,620,851	1,923,228	302,377
Manitoba	18,995	65,954	46,959
Brit. Columbia	36,247	49,459	13,212
N. W. Territories		56,446	
Totals	3,635,024	4,324,810	633,338

Of the principal cities the population in 1881 was as follows, compared with the previous period:

Cities.	1871.	1881.	Increase.
Montreal	107,225	140,747	33,522
Toronto	56,092	86,415	30,323
Quebec	59,699	62,446	2,747
Halifax	29,582	36,100	6,518
Hamilton	26,716	35,961	9,245
Ottawa	21,545	27,412	5,867
St. John	25,805	26,127	Decrease.
London	15,826	19,746	3,920
Kingston	12,407	14,091	1,684
Charlottetown	8,807	11,485	2,678

The decrease in the population of St. John is correctly attributed to the great fire of 1877, which laid a large part of the city in ashes. Large numbers of people were immediately driven to the United States, where the revival of prosperity in 1878 caused their employment in permanent industries, and prevented their return.

The religious complexion of the population of the Dominion is as follows (census of 1881):

Baptists	296,525	Methodists	802,961
Roman Catholics	1,791,982	Presbyterians	676,165
Church of England	574,818	Protestants	6,519
Congregationalists	26,900	Quakers	6,552
Disciples	20,193	Unitarians	2,126
Lutherans	416,350	Universalists	4,517
Jews	2,393	Other denominations	14,269
Episcopal Reformed	2,596	No religion	2,634
Not given in returns	86,769		

TRADE AND COMMERCE.—Since 1866 questions of trade and commerce have been of paramount interest in Canada. In that year the Reciprocity Treaty of 1854 was terminated on notice given by the United States. The causes that led to the abrogation of the treaty by the United States have been variously stated at various times. No doubt there was a mingling of political as well as commercial motives in the minds of those responsible for the perfectly legal and regular proceeding. The Protectionists did not find the treaty profitable; the Unionists did not relish the active aid extended to the cause of the South. The treaty fell a victim to both. The immediate consequences to Canada were very striking. The channels of trade were choked up. The intimate trade-relations that had been established with the United States could not be sundered without loss to the weaker people. The agricultural products, the coal and the fish, that from Sarnia to Charlottetown had been sold in the United States, had for a time no markets at all, or such markets as were insufficient. Consequently, in 1866, 1867, and 1868 there was a good deal of commercial distress in the British provinces. In 1867 the political deadlock that existed, combined with commercial depression, made confederation imperative; and thus the severance of commercial relations with the United States may be said to have been one of the determining causes of confederation. It had other effects as well. It forced on the Canadian people the problem of protecting their own fisheries. This led in due time to the Washington Treaty and the Fishery Commission at Halifax. Great Britain recognized Canada's right to be consulted, by appointing Sir John Macdonald a commissioner. She recognized, as she had never done before, the whole case of Canada by adopting as her own all the arguments of the Canadian authorities. And the Halifax award of 1877, however objectionable it may be to the American people, remains a strong precedent in favor of the

Value of Total Exports, Imports, and Goods entered for Consumption in the Dominion, with the Duty collected thereon, for Fourteen Years.

	Total exports.	Total imports.	Entered for consumption.	Duty.
Fiscal year ending 30th June, 1868	$57,567,888	$73,459,644	$71,985,306	$8,819,431.63
" " 1869	60,474,781	70,415,165	67,402,170	8,298,909.71
" " 1870	73,573,490	74,814,339	71,237,603	9,462,940.44
" " 1871	74,173,618	96,092,971	86,947,482	11,843,655.75
" " 1872	82,639,663	111,430,527	107,709,116	13,045,493.50
" " 1873	89,789,992	128,011,281	127,514,594	13,017,730.17
" " 1874	89,351,928	128,213,582	127,404,169	14,421,882.67
" " 1875	77,886,979	123,070,283	119,618,657	15,361,382.12
" " 1876	80,966,435	93,210,346	94,733,218	12,833,114.48
" " 1877	75,875,393	99,327,962	96,300,483	12,548,451.09
" " 1878	79,323,667	93,081,787	91,199,577	12,795,693.17
" " 1879	71,491,255	81,964,427	80,341,608	12,939,540.66
" " 1880	87,911,458	86,489,747	71,782,349	14,138,849.22
" " 1881	98,290,823	105,330,840	91,611,604	18,500,785.97
Aggregate for fourteen years	$1,099,317,300	$1,364,912,901	$1,305,787,936	$178,027,860.58

claims of Canada to the possession of most valuable fishing grounds. But the results of the severance of trade-relations were not yet at an end. From 1867 to 1873 the inflation of the currency in the United States enabled a 15 per cent. tariff to give efficient protection to Canadian manufactures. In 1873 the inflation began to disappear, and the Canadian tariff began to be insufficient to save the home market from the competition of American manufacturers, who were willing to give discounts of from 10 to 25 per cent. in order to keep their market in Canada. In 1874 a change of government took place, the Liberals coming into power at the general election in that year. Almost from the time they took office the depression that existed generally fastened on Canada. The Liberal Conservatives proclaimed the gospel of protection to native industries as the one thing necessary to give aid to the manufacturing classes, and a greater command of the home market to the agricultural class as well. In 1877 and 1878, Sir John Macdonald and his friends fought out in Parliament the battle of protection. They were beaten in the House of Commons. But at

Aggregate Trade of the Dominion on the Basis of Goods entered for Consumption, and Exports, by Countries.

Countries.	1876.	1877.	1878.	1879.	1880.	1881.
Great Britain	$83,474,320	$81,139,706	$83,372,719	$67,288,848	$80,307,286	$97,335,378
United States	75,986,909	77,087,914	73,876,637	70,904,720	62,696,857	73,570,337
France	2,394,812	1,730,062	1,754,394	2,247,066	1,928,670	2,294,043
Germany	603,355	404,918	521,580	552,999	532,028	1,019,198
Spain	445,151	340,757	325,245	394,445	297,245	446,337
Portugal	199,195	175,425	145,941	161,258	201,652	165,487
Italy	183,199	242,942	205,171	181,933	623,295	234,723
Holland	297,895	296,860	286,764	210,288	273,837	440,944
Belgium	374,880	318,724	305,692	219,461	837,897	671,267
Newfoundland	2,675,477	2,753,748	2,767,347	2,280,823	2,092,261	2,175,773
British West Indies	3,017,337	2,835,365	2,528,549	2,605,671	3,114,875	3,676,508
Spanish West Indies	1,777,269	1,847,826	1,456,985	1,813,567	3,031,050	3,067,425
French West Indies	340,153	185,234	268,424	237,129	232,857	129,360
Other West India islands	156,674	163,242	144,038	96,732	110,475	89,223
South America	975,762	656,596	669,804	745,830	1,073,421	1,369,731
China and Japan	971,314	455,755	486,244	505,513	931,457	1,430,734
Switzerland	56,168	69,066	61,178	94,781	94,225	141,789
Australia	79,693	185,610	370,723	292,613	141,782	146,506
South Africa	314,323	120,564	91,384	152,107	218,853	220,459
Other countries	1,370,467	1,165,560	904,425	847,079	953,784	1,277,205
Totals	$175,699,653	$172,175,876	$170,523,244	$151,832,863	$159,693,807	$189,902,427

Value of Goods Imported for Consumption, by Countries.

Countries.	1876.	1877.	1878.	1879.	1880.	1881.
Great Britain	$40,734,260	$39,572,239	$37,431,180	$30,993,130	$34,461,224	$43,583,806
United States	46,070,033	51,312,669	48,631,739	43,739,219	29,346,948	36,704,112
France	1,840,877	1,410,732	1,385,003	1,532,191	1,115,841	1,631,332
Germany	482,587	370,594	399,326	440,909	449,791	934,266
Spain	436,034	278,098	277,429	343,849	236,518	399,684
Portugal	71,655	45,465	41,913	25,510	35,767	56,893
Italy	40,412	29,250	53,310	33,461	459,508	88,726
Holland	267,079	202,557	213,014	200,575	171,245	225,190
Belgium	361,055	251,812	255,694	179,031	149,086	412,834
Newfoundland	774,586	641,642	672,665	639,406	581,961	652,304
British West Indies	868,846	640,716	578,405	650,987	1,208,822	1,888,695
Spanish West Indies	631,140	503,451	417,178	575,969	1,711,462	1,999,813
French West Indies	47,158	25,022	21,686	18,008	8,884	18,185
Other West India islands	68,969	13,620	16,580	8,365	15,986	8,454
South America	287,553	4,971	15,447	4,388	283,481	637,620
China and Japan	948,239	418,606	383,676	448,962	893,911	1,410,973
Switzerland	56,168	69,066	61,178	94,781	94,225	141,789
Australia	50	.....	.....	1,851	1,881	143
South Africa	290,359	97,394	45,019	106,592	136,675	138,815
Other countries	456,158	352,579	299,135	305,324	419,133	777,968
Totals	$94,733,218	$96,300,483	$91,199,577	$80,341,608	$71,782,349	$91,611,604

Value of Exports, by Countries.

Countries.	1876.	1877.	1878.	1879.	1880.	1881.
Great Britain	$40,723,477	$41,567,469	$45,911,539	$36,295,718	$45,846,062	$53,751,570
United States	31,933,459	25,775,245	25,244,898	27,165,501	33,349,909	36,866,225
France	553,935	319,330	369,391	714,875	812,829	662,711
Germany	125,768	34,324	122,254	112,090	82,237	84,932
Spain	9,417	62,659	47,816	50,596	60,727	46,653
Portugal	127,540	129,960	104,028	135,748	165,885	108,594
Italy	142,787	213,692	151,861	148,472	163,787	145,997
Holland	30,816	94,303	53,750	9,713	102,592	215,754
Belgium	13,825	66,912	49,998	40,430	688,811	258,433
Newfoundland	1,900,891	2,112,106	2,094,682	1,641,417	1,510,300	1,523,469
British West Indies	2,148,491	2,194,649	1,950,144	1,955,584	1,906,053	1,787,813
Spanish West Indies	1,146,129	1,284,375	1,069,807	1,237,598	1,319,588	1,167,612
French West Indies	292,995	160,212	246,738	219,121	223,973	111,175
Other West India islands	87,705	149,622	127,458	88,367	94,489	80,769
South America	688,209	651,625	654,357	741,442	789,940	732,111
China and Japan	23,075	37,149	102,568	56,551	37,546	19,761
Australia	79,643	185,610	370,723	290,762	139,901	146,363
South Africa	23,964	23,170	46,365	45,515	82,178	81,644
Other countries	914,309	812,981	605,290	541,755	534,651	499,237
Totals	$80,966,435	$75,875,393	$79,323,667	$71,491,255	$87,911,458	$98,290,823

the general elections in Sept., 1878, they swept the country, and came into office with a majority of 85 in a House of 206 members, pledged to the policy of protection, which thenceforth was called the "national policy."

A glance at the above tables will show the effect of the "national policy" on England, on the United States, and on Canada itself. Three things are proved beyond any question:

1st. That the Canadian national policy, instead of diminishing, has increased trade with Great Britain;

2d. That it has very materially decreased the trade with the United States, largely increasing the export, but somewhat decreasing the import;

3d. That though the times have been prosperous and the population has increased since 1874 by at least half a million, the imports in 1882 are less than in 1874 by $14,755,242; which means that goods of at least that value, formerly imported, are now manufactured at home.

Increase of Manufacturing since 1878.

The increase which has taken place in manufacturing activity in Canada since the principle of fostering home manufactures was established by Sir John Macdonald in the parliamentary session of 1879 will be evident from the subjoined statistics, supplied to Parliament by the factory commission during the session of 1882:

Number and kind of new factories started since 1878: Knitting, 7; nut and bolt, 2; knitting-needle, 1; tobacco, 2; barb wire, 1; foundries, 3; furniture, 3; woollen, 7; paper boxes, 2; boots and shoes, 3; clothing, 1; buttons, 3; organs, 3; paper-mills, 3; boilers, 1; cigar-boxes, 1; children's carriages, 1; paint, 1; salt-drying, 1; window-shades, 1; locks, 1; caps, 1; gloves, 1; mill-furnishings, 1; planing-mill, 1; lamp goods, 1; hats, 1; blankets, 3; cork, 1; envelope, 1; shirts, 2; cotton, 4; clocks, 1; metal plated ware, 2; iron bridges, 1; glass, 3; emery-wheels, 1; sugar, 5; files, 1; canning, 2; silk, 2; pianos, 4; corsets, 1; picture-frames, 4; potteries, 2; brush, 1; slippers, 1—total, 96.

The number of hands employed at these new factories is 7242, divided as follows:

Foundries, 358; furniture-factories, 78; cotton-factories, 700; organ-and-piano factories, 207; boot-and-shoe factories, 506; woollen and knitting factories, 1045; manufactures of paper, 175; manufactures of wood, 179; manufactures of iron, 469; tobacco-factories, 169; glass and potteries, 833; sugar-refineries, 918; articles of clothing, 612; miscellaneous, 993—total, 7242.

Percentage of Increase in the Number of Hands employed in Factories which were in existence prior to September, 1878.

In foundries the increase has been	...	14	per cent.
Furniture-factories	...	20	"
Boot-and-shoe "	...	11	"
Organ-and-piano factories	...	28	"
Cotton "	...	30	"
Woollen and knitting	...	19	"
Tobacco and cigar	...	7	"
Clothing	...	14	"
Glass and pottery works	...	25	"
Rope, flax, and brush works	...	11	"
Manufactures of paper	...	10	"
" wood	...	10	"
" iron	...	16	"
Miscellaneous manufactures	...	23	"

Comparison of the Prices of Manufactured Goods between Jan., 1879, and the date of our visit in 1881:

No. of factories that have made no change in price of goods				322
Factories that have increased by	25	per	cent...	2
" "	20	"	...	4
" "	15	"	...	1
" "	12	"	...	1
" "	10	"	...	18
" "	7½	"	...	1
" "	5	"	...	18
Factories that have decreased by	25	"	...	3
" "	20	"	...	3
" "	15	"	...	5
" "	10	"	...	11
" "	5	"	...	25
Number from which we got no information			.....	13

The increase in most of the factories was stated to be on account of an advance in the price of their raw material.

Comparison of the State of Wages between Jan., 1879, and the date of our visit in 1881.

No. of factories where wages have remained the same			...	135
Factories started since Jan., 1879, and made no change			..	50
Factories showing increase of	35	per	cent.....	3
" "	33	"	.....	2
" "	30	"	.....	9
" "	25	"	.....	21
" "	20	"	.....	42
" "	17½	"	.....	1
" "	15	"	.....	66
" "	12½	"	.....	5
" "	10	"	.....	33
" "	8	"	.....	4
" "	5	"	.....	31
State of wages not given			.....	4
Factories showing decrease			.....	none.

Number of Hands directly employed at Sugar-refining.

St. Lawrence, Montreal	320
Redpath's, "	350
Nova Scotia, Halifax	150
A. Jones's, "	33
Monckton, N. B	60
Costicook	200
Total	1113

Comparison of Number of Hands employed at Cotton-factories.

	1878.	1880.	1881.
Dundas	475	525	525
Canada, Cornwall	425	575	575
Merritton	70	95	95
Valleyfield	400	540	790
Lybster	180	220	220
St. John, N. B	300	410	560
Hudon, Montreal	800	1000	1600
Brantford	....	120	120
Coaticook	....	225	225
Stormont, Cornwall	....	225	675
Hamilton	....	125	125
Kingston	....	....	250
Hespeler	....	....	250
Hamilton	....	Estim.	300
St. Henri	....	....	400
Halifax	....	....	450
Windsor, N. S	....	....	300
Monckton, N. B	....	....	300
St. Stephen, N. B	....	....	450
St. John, N. B	....	....	400
Totals	2150	4060	8610

In all, an increase of 6460 hands in 1882 over 1878.

Agricultural Progress.

In regard to the effect of the new fiscal policy on the business of agriculture the following figures, among others, were presented to Parliament in 1882 by a parliamentary committee:

Imports for Consumption of Agricultural Products.

1877-78	$21,096,628
1880-81	8,267,497
Decrease	$12,829,131

This shows a very great and favorable command of the home market given to the Canadian farmers.

Imports Re-exported.

1877-78	$13,625,012
1880-81	24,181,280
Increase	$10,556,268

This shows a very large increase in the export business, which those who opposed the "national policy" contended would be greatly checked by that policy.

The committee of Parliament in their report use the following language: "In reference to the effect of large exportations of farm products on the general prosperity of the farmers and people generally, we submit the following comparison of exports from the Dominion of Canada of agricultural products, including animals and their products:

1871	$22,436,071	1877	$28,909,993
1872	25,795,175	1878	32,028,611
1873	29,238,457	1879	33,729,068
1874	34,269,312	1880	39,901,905
1875	29,958,865	1881	42,628,545
1876	34,657,319		

"It will be seen that in 1871, 1872, and 1873 the exports were much below the subsequent years from 1874 to 1878 inclusive, yet business was prosperous in the former period and depression existed in the latter. Since the tariff came into operation our people have not only supplied the additional home-market of $12,029,131, given by the exclusion of American farm produce, but have also exported very largely; which would lead to the conclusion that the protective tariff had stimulated the production of farm products.

"The home demand and prices obtained for meat stuffs, butter, poultry, and eggs, as well as fruit and vegetables, has been demonstrated by the evidence to be largely increased as a result of the tariff stimulating manufacturing industries and improving the condition of the mechanic and laboring-man, as well as by the exclusion of American competition in many of these articles. Fruit-growing has been especially benefited and stimulated by the operation of the tariff excluding foreign fruit which competed with Canadian-grown. A wider area of land is yearly being devoted to fruit culture, and Canadian nurserymen find a much larger demand at profitable prices for fruit trees of every description which thrive in Canada. Indeed, from the rapidly increasing demand for fruit in Manitoba and the North-west, and from the fact that fruit trees do not thrive in that territory, it is evident that fruit-growing will become more and more an important and remunerative branch of husbandry in the older provinces."

The Finances.

The financial affairs of Canada since the establishment of the Dominion in 1867 have seen three periods: 1st, a period of increasing revenue and surpluses from 1867 to 1874; 2d, a period of depression, of decreasing revenue, and of deficits from 1874 to 1878; and 3d, a period of increasing revenue and a rapid accumulation of surpluses from 1878 to 1882. The following are the official figures of the receipts and expenditures since 1867, showing the surpluses and deficits:

Expenditure as per Public Accounts.	1867-68.	1868-69.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.
Charges for management of debt, interest, and subsidies	$7,969,990	$8,403,527	$8,102,191	$8,638,565	$9,004,362	$8,717,076	$10,255,788
Ordinary expenditure	3,630,298	3,459,485	3,891,592	4,610,401	5,873,519	7,062,095	8,394,076
Charges on revenue	1,885,804	2,175,071	2,351,724	2,374,114	2,711,587	3,395,475	4,736,442
Total charged to consolidated fund	$13,486,092	$14,038,084	$14,345,509	$15,623,081	$17,589,468	$19,174,647	$23,316,316
Total receipts of revenue as per public accounts	13,687,928	14,379,174	15,512,225	19,335,560	20,714,813	20,813,469	24,205,092
Yearly surpluses	$201,836	$341,090	$1,166,716	$3,712,479	$3,125,345	$1,638,822	$888,776

Expenditure as per Public Accounts.	1874-75.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.
Charges for management of debt, interest, and subsidies	$11,124,726	$11,122,359	$11,489,326	$11,659,523	$11,952,641	$12,659,667	$12,535,837
Ordinary expenditure	7,868,690	8,569,774	6,835,078	6,542,510	6,941,577	6,963,852	7,993,563
Charges on revenue	4,719,654	4,796,238	5,194,896	5,301,124	5,561,162	5,227,113	5,068,153
Total charged to consolidated fund	$23,713,071	$24,488,372	$23,519,300	$23,503,158	$24,455,381	$24,850,634	$25,502,554
Total receipts of revenue as per public accounts	24,648,715	22,587,587	22,059,274	22,375,011	22,517,382	23,307,406	29,636,297
Yearly surpluses	$935,644						$4,132,743
" deficits		$1,900,785	$1,460,026	$1,128,147	$1,937,999	$1,543,228	

The amount of expenditure on national works and for national purposes since 1867 is as follows:

Miscellaneous public works	$25,731,684
Pacific Railway	21,457,263
Intercolonial Railway	25,878,448
Works in North-west Territory and Dominion lands	3,254,681
Total debts allowed provinces	20,452,340
Total capital expenditure since confederation	$96,774,416
Net increase of debt since confederation	79,667,139

The revenue has shown itself so progressive that the finance minister, Sir Leonard Tilley, has calculated that by the close of 1884 he will have accumulated such a succession of surpluses, and will have so reduced the public debt, that he will be in a position to pay the subsidy of the Pacific Railway syndicate, $25,000,000, without having added to the *per capita* taxation of the people. During the session of 1881 taxes to the extent of $1,250,000 were repealed, tea and coffee (except when imported from the United States, when a duty of 10 per cent. is exacted to encourage direct trade with the places of growth) being made free, the stamp-duties being taken off, the postage on newspapers removed, and a variety of articles added to the free list. And in the session of 1882 a further sum of about $1,250,000 was taken from the taxation, thus making a reduction in taxation of about $2,500,000 in two years.

The Pacific Railway.

The greatest public work ever undertaken by so young and so comparatively poor a country as Canada is the Canadian Pacific Railway, which begins east at Callender Station, at the end of Lake Nipissing, and ends at Port Moody on the Pacific coast. It was first made a public work by the terms on which British Columbia entered the Confederation in 1871. In 1873 an attempt was made by the Government of Sir John Macdonald, by means of a company, to begin the work on a subsidy of $30,000,000 and 50,000,000 acres of land. Partly owing to the defeat of the Government, and partly to the failure of the company to float their scheme in the London market, this plan fell through. The next Government, of Hon. Alexander Mackenzie, entered on the construction of the railway as a Government or public work. The first expenditure on construction, as stated in the reports of Mr. Sandford Fleming, was made in 1874, when contracts for a telegraphic line to precede the railway were let. In the same year contracts for the Pembina section, for 63 miles north of the international boundary-line, were given out. By 1878 this line was extended to Selkirk, a distance of 85 miles, and in 1881 it became a part of the subsidy to the syndicate which undertook the construction of the whole road. In 1874 also a subsidy was granted for the construction of the Canada Central line to the eastern terminus, near Lake Nipissing. In 1875 two sections of the line between Thunder Bay and Winnipeg were placed under contract. In 1878 a branch line was undertaken to the Georgian Bay, but this was abandoned. In 1879 the remaining sections of the line between Thunder Bay and Red River were contracted for. In the same year a section 100 miles west of Red River was let. In 1880 a section of 120 miles was let in the mountain-region, from Yale to Kamloops. In 1881 the Government entered into a contract with a private company for the construction of the remaining sections and the operation of the whole line at its own cost. The subsidy of the company is $25,000,000 and 25,000,000 acres of land, valued at $1 per acre, and the whole line, when completed, is to go to the company, making the subsidy and total cost of the road $78,000,000, or thereabouts. The work of construction has gone on with rapidity. The line from Thunder Bay to Red River and 200 miles beyond is now open for traffic. The section in British Columbia to the terminus on the Pacific is under contract, and the company has promised to finish the section north of Lake Superior in five years, or in 1886, or five years earlier than their contract requires. When this great work is completed, and supplemented by a line connecting with American roads at the Sault Ste. Marie, it is hoped in Canada that a new and splendid era of national prosperity will open.

Railway Statistics.

The spread of railway-lines in Canada has been steady. The building of the Intercolonial Railway, connecting Halifax with Quebec, was one of the best results of confederation; and since that line was completed there has been a more rapid growth in railway enterprise. The mileage on the 30th of June, 1880, was—

Railways in operation	6891·18
" under construction and having track laid	338·65
" under construction	1077·66
	8307·69

Private capital invested	$284,419,293
Government subsidies (including provincial and municipal grants)	104,866,406
	$389,285,699

Number of Passengers carried on Principal Lines.

Name of railway.	1880-81.	1879-80.	Increase.	Decrease.
Grand Trunk and leased lines	2,179,793	1,995,526	184,267	
Great Western and leased lines	1,838,788	1,764,519	74,269	
Intercolonial	631,245	581,483	49,762	
Canada Southern	260,990	*278,818	.....	17,828
Northern and North-western	411,847	386,169	25,678	
Midland	116,554	116,857	.....	303
Toronto, Grey, and Bruce	111,076	121,685	.....	10,609
Toronto and Nipissing	87,058	89,933	.....	2,875

*1878-79.

The freight carried on the same lines during the two years compares thus, in tons:

Name of railway.	1880-81.	1879-80.	Increase.
Grand Trunk and leased lines	3,295,288	2,835,561	459,727
Great Western " "	2,572,052	2,216,382	355,670
Intercolonial	725,577	561,924	163,653
Canada Southern	2,135,811	1,836,948	298,863
Northern and North-western	562,309	489,600	72,709
Midland	202,095	137,515	64,580
Toronto, Grey, and Bruce	116,487	115,257	1,230
Toronto and Nipissing	120,573	105,473	15,100

The earnings of the railways compare as follows:

	1880-81.	1879-80.	Increase.
Passengers	$8,223,254	$7,076,340	$1,146,914
Freight	18,666,982	15,506,935	3,160,047
Mails and express	946,159	851,288	94,871
Other sources	145,332	102,076	43,256
Total	$27,987,509	$23,536,639	$4,450,770

The earnings per mile of railway under traffic were therefore—

	1880-81.	1879-80.
Passenger traffic	$1135	$1024
Freight "	2574	2243
Mails and express	130	123
Other sources	20	15
Total	$3859	$3405

Canada's Relation to England.

Within the past decade—since, in fact, the establishment of the Dominion—a very marked change has come over the relations that existed between Canada and Great Britain. This change has not come about insensibly or as a matter of development; it has proceeded by regular steps from point to point, each party recognizing the change as it proceeded, and giving official sanction to it. In 1869, in consequence of discontent with the financial terms on which Nova Scotia had been pledged to the union by the local government previous to the formation of the Dominion, the local government which came into office after the union appealed to England for repeal of the union. But the British Government refused to entertain the petition, and referred the question to the new government of the Dominion. England wished to get rid of these provincial questions. In 1871, when the fishery-question discussion precipitated the Washington convention and widened the field of discussion for that body, Sir John Macdonald was appointed as an imperial commissioner, and was recognized as probably the ablest man engaged on the British side in that too-famous negotiation. In 1876, it having been discovered that the governor-general, appointed by England and having large powers of action, might exercise the prerogative of mercy independent of the judgment of his responsible advisers, the British Government consented at once to change the royal instructions in that respect; and this was accordingly done. In 1877, when the fishery commission was to sit at Halifax, Sir Alexander Galt, a Canadian, was appointed the British commissioner. In 1879, the Dominion Government having removed the lieutenant-governor of Quebec for improper and unconstitutional conduct in dismissing for political purposes his ministers, who had a parliamentary majority, and the governor-general himself having disapproved of the act of his ministers, the British Government reproved the marquis of Lorne for not having taken the advice of his ministers. In 1880, Sir Alexander Galt was, at the request of the Canadian Government, admitted as a diplomatic representative in London; and the colonial secretary in a public speech pledged the Government of the empire not to engage in foreign negotiations without considering the interests of Canada. Thus, step by step, each well defined and well considered, the position of Canada in the empire was made more marked, more independent, and more dignified. But when, in the session of 1881, the leader of the opposition attempted to go further and asked the House of Commons of Canada to declare for the right to negotiate treaties independent of England, the loyalty of the House and of the people took fire, and the proposition, in view of the position already held by Canada, was rejected with indignation, though it is still entertained by a small portion of the press of the Dominion. In the session of 1882 papers were brought down to Parliament, from which it appeared that the imperial authorities had recognized the right of Canada to impose differential duties; and in a speech delivered to the two houses of Parliament on May 25, 1882, the marquis of Lorne, governor-general, used this remarkable language: "You have the power to make treaties on your own responsibility with foreign nations, and your high commissioner is associated, for purposes of negotiation, with the Foreign Office. You are not the subjects but the free allies of a great country, which gave you birth and is ready with all its energy to be the champion of your interests. Standing side by side, Canada and Great Britain work together for the commercial advancement of each other."

The gradual growth of independence in the matter of local self-government has been especially marked in the matter of fiscal policy. "In 1859," says Mr. Todd in his valuable work on parliamentary government in the colonies, "upon the enactment of a new Canadian tariff, certain manufacturers of Sheffield moved the colonial secretary, the duke of Newcastle, to protest against it. Whereupon His Grace wrote a despatch to the governor-general, dated Aug. 13, 1859, upon the subject. In reply, Mr. (now Sir Alexander) Galt, the Canadian finance minister, wrote a memorandum which was transmitted to the Colonial Office by the governor-general, wherein he asserted it to be his duty 'distinctly to affirm the right of the Canadian legislature to adjust the taxation of the people in the way they deemed best, even if it should unfortunately happen to meet the disapproval of the imperial ministry. Her Majesty cannot be advised to disallow such acts unless her advisers are prepared to assume the administration of the affairs of the colony irrespective of the views of its inhabitants.' 'This position,' he added, 'must be maintained by every Canadian administration.' The imperial Government did not attempt to question the soundness of this position, and they have ever since evinced a disposition to acquiesce in the exercise by the Canadian Parliament of the utmost freedom in the determination of their commercial policy, without regard to its application to, or agreement with, the ideas embodied in the legislation of the mother-country or advocated by the ministers of the Crown in Great Britain. In 1867, by the British North America Act, the act of union of the colonies, the exclusive authority of the Dominion to regulate matters of trade and commerce was recognized. In 1879, on the passing of the new protective policy in Canada, certain of the manufacturers of the great manufacturing towns again made protest in England, but the colonial secretary was not in a position to do other than declare the perfect freedom of Canada to regulate her own affairs; and the governor-general of Canada forwarded a memorandum showing that the trade of the Dominion was in fact more likely to be increased than diminished with England by the new fiscal system. The right of appointing the governor-general of the Dominion, the right of disallowing acts not affecting trade and commerce within two years, and the right of making treaties affecting the Dominion as a portion of the empire,—are the only claims to supremacy now asserted by Great Britain. The first of these will long stand, as it is an obvious advantage to the Dominion to have a governor-general of such rank and ability as can be provided from among the body of British peers and diplomats, and free from any bias towards either of the political

parties. The second right has only been exercised once since the formation of the Dominion. And the third has been minimized by a repeated public pledge that the rights of Canada shall be considered and her interests protected in the negotiation of all treaties likely to affect them in any way."

By an order in council the North-west Territories of Canada in 1882 were divided into four new territories: (1) Assiniboia (area, 95,000 square miles), bounded S. by the United States, E. by Manitoba, N. by a line near the 52d degree of N. latitude, and W. by a line between the 110° and 111° W. longitude; (2) Saskatchewan (114,000 square miles), lying N. of Assiniboia and W. of Lake Winnipeg and the river Nelson (or Lower Saskatchewan); (3) Alberta (100,000 square miles), lying between Assiniboia on the E. and British Columbia on the W., having the United States on the S., and on the N. the territory called (4) Athabasca (122,000 square miles), which includes the Peace River Valley and its vicinity. (M. J. G.)

CANAJOHARIE, a village of Montgomery co., N. Y., is on the S. bank of the Mohawk River, on the New York, West Shore, and Buffalo Railroad, 55 miles W. of Albany. The New York Central Railroad passes along the N. bank of the river, and has here a station called Palatine Bridge. The town has three hotels, two banks, three weekly newspapers, machine-shops, planing-mills, flour-mills, a brewery, and manufactures of sacks, shirts, gloves, washboards, trunks, pulley-blocks, and carriages. It was originally called Roof Village. About 9 miles S. is the famous watering-place, Sharon Springs, Population, 2086.

CANAL DOVER, an incorporated village of Tuscarawas co., Ohio, is on the Tuscarawas River and the Ohio Canal, 100 miles N. of Marietta. It is on four railroads—the Cleveland and Marietta, the Cleveland, Tuscarawas Valley, and Wheeling, the Wheeling and Lake Erie, and a branch of the Cleveland and Pittsburg Railroad. It has three hotels, two banks, two weekly newspapers, two schools, seven churches, and a children's home. Its industrial works are a blast-furnace, two foundries, two salt-works, two fire-brick works, a rolling-mill, flour-mill, furniture-factories, three carriage-factories, and a planing-mill. It was settled in 1825, and incorporated in 1865. The surrounding country contains coal and iron. Population, 3500.

CANBY, Edward Richard Sprigg, LL.D. (1817–1873), an American general, was born in Kentucky in 1817. He graduated at West Point in 1839, served in the Florida War, and in 1842 had charge of the removal of Indians from Georgia to Arkansas. He served in the Mexican War under Gen. Scott, and was twice brevetted for gallantry. He attained the rank of captain in 1851, major in 1855, and colonel in 1855. At the outbreak of the Civil War he was stationed at Fort Craig in New Mexico, and when his superior officers had resigned to join the Confederacy he displayed great skill and energy in defending the fort against the Texan troops. He fought the battles of Valverde and Peralta, and was made brigadier-general of volunteers March 31, 1862. He was then employed on special duty in the War Department at Washington, and in July, 1863, was placed in command at New York to suppress the riots caused by the draft. In May, 1864, he was promoted to be major-general of volunteers, and succeeded Gen. N. P. Banks in command of the armies west of the Mississippi River. In 1865 he conducted the operations against Mobile, capturing that city April 12, and received the surrender of the Confederate generals Richard Taylor and E. K. Smith. After the close of the war he had command of various departments in the Southern States, and was appointed brigadier-general in the regular army July 28, 1866. He was often chosen for important and difficult positions, and in 1869, though fatigued by laborious duties, he consented to take command of the Department of Columbia on the Pacific coast. In the winter of 1872–73 the Modoc Indians, occupying the "lava beds" in the northern part of California, gave trouble. Gen. Canby proceeded to the place, and while holding a parley with them was treacherously shot by a chief called Captain Jack, April 11, 1873.

CANE. This plant gives the name to the well-known canebrakes in the southern portion of the Atlantic section of the United States. It is the largest grass of the United States, and not very distantly related to the celebrated bamboo of the Asiatic lands. These canes constitute the genus *Arundinaria*, which, with *Bambusa* (the bamboo) and about ten other less-known genera, form the *Bambusidæ*, or bamboo section of the great family of Grasses. The species which forms the Southern canebrakes is *Arundinaria macrosperma* of Michaux, though, for some unexplained reason, renamed *A. gigantea* by Chapman. It grows from 10 to 20 feet high, though Dr. Darlington reports in his *Agricultural Botany* that it sometimes grows "30 feet or more," when it makes admirable poles for the disciples of Izaak Walton. A smaller species, *Arundinaria tecta*, growing from 2 to 10 feet, is critically distinguished as the "reed," but in popular works "Cane" is often used indifferently for either species, which, after all, may be but forms of one. Unlike grasses generally, which put up culms that flower and die the same year, the Cane sends up a single straight stalk the first year, and the next branches out from the nodes. The year following it may flower, but perhaps not for several years; but after it flowers it dies back to the ground, and then pushes up a new growth from its creeping root-stocks. Cattle are extremely fond of it, and thrive on it to a wonderful extent where it abounds; and it is not unusual to find it put forth as among the great advantages of farm-lands when offered for sale that there is abundance of Cane on which cattle at large may feed all winter long. In some parts of Georgia an South Carolina, however, where Cane once abounded, it has almost wholly disappeared from the continual browsing of cattle, which prevents so strong a growing plant from strengthening its roots by exposure of mature leaves to the atmosphere. Still, in wet places, where cattle have not free access, there are yet enormous quantities, and mills prepare it for paper-stock. The smaller species, *A. tecta*, is very useful in affording its split stems for making chair-bottoms, baskets, and similar work, while the leaves are said to impart a fine green color to wool.

See Vol. IV. p. 711 Am. ed. (p. 805 Edin. ed.).

A number of species are found in warmer parts of the world. Some of them, as in the East Indies, are used for thatching roofs, as the large amount of silex the culms contain prevents rapid decay. One species, *Arundinaria Schomburgkii*, furnishes, in the hollow stems taken between the nodes, the Indians of Guiana with the blowguns from which they expel the arrows which have had their heads dipped in the fatal *urari*.

The two species of the United States are not often found north of the Potomac. Dr. Cooper, in his *Essay on the Forests of the United States*, reports the larger species as growing "in Delaware and the lower

counties of Maryland." The smaller form the writer has gathered in Illinois. (T. M.)

CANNELTON, an incorporated village and the county-seat of Perry co., Ind., on the Ohio River, 70 miles above Evansville. It has eight churches, seven hotels, two weekly newspapers, a graded school, gas-works, a large cotton-mill, a public park, and manufactures of chairs, paper, brooms, flour, stone-ware, sewer-pipe, iron castings, etc. The Indiana cotton-mill of this place is a sandstone structure 300 feet long and five stories high. In the vicinity are immense beds of cannel coal, extensively used in steamboats. Cannelton was settled in 1849. Population, 1834.

CANON OF SCRIPTURE. The article in the ENCYCLOPÆDIA BRITANNICA teaches that the Canon of the Scriptures was determined by selecting certain books, long after they were written, from a certain mass of existing literature, and counting them as thenceforth a class by themselves; that the New Testament was thus selected mainly "by a few leading Fathers towards the close of the second century;" that the Law, the Prophets, and the Hagiographa are three successive instalments of the Old-Testament Canon; that the third of these lesser canons was made "about a century or more anterior to the Christian era," and finally settled at the Council of Jamnia, about 90 A. D.

See Vol. V. p. 8 Am. ed. (p. 1 Edin. ed.).

The truth of these teachings depends largely upon definition. The term *Scripture* denotes a certain well-known collection of writings which are, in a peculiar sense, the sacred writings of the Israelitish and Christian religions. To indicate that a writing is entitled to belong to this collection we may say that it possesses *scriptural character*. We may thus employ these simply as convenient descriptive terms, irrespective of their relation to divine inspiration or kindred matters. Now, by the statement that the canonical Scriptures were selected from a larger body of literature one might possibly mean that they received their scriptural character from the alleged selection—that they became Scripture by being so selected; or he might mean that the selection was the authoritative human recognition of the scriptural character which, in their own right, they already possessed; or he might count the so-called selection to be simply an historical inquiry and decision in regard to the scriptural character which they had previously possessed and been recognized as possessing. In other words, canonicity may be either (1) scriptural character, or (2) recognized scriptural character, or (3) historical decision in regard to recognized scriptural character.

The article to which we refer certainly does not claim that the Scriptures derive their scriptural character from the men who collected them. It takes the distinctively Protestant and evangelical position that "the canonical authority of Scripture does not depend on the Church or its councils. The primitive Church may be cited as a witness for it; that is all. Canonical authority lies in the Scripture itself; it is inherent in the books so far as they contain a revelation or declaration of the divine will." But its statements beyond this point, like those of much of the recent literature on the subject, are very uncertain. While they are true only under the third definition, they yet employ the terminology which more naturally connects itself with the first or second. This will be made clear if, using the language just quoted, we ask, What is it for which "the primitive Church may be cited as a witness"? According to the hierarchical view, it is for the fact that the Church, being divinely authorized to do so, assigned to the books their scriptural character, so that the authority of the Bible depends upon that of the Church. According to another familiar view, the witness is to the fact that the books were received as scriptural from the times when they were published, and hence that the same influences which gave them their scriptural character caused them to be recognized and received in that character. But in the article in the ENCYCLOPÆDIA BRITANNICA the witness is represented as being to the still different fact that certain men, acknowledged to be both uninspired and incompetent, seeing the need of "a code of apostolic writings, divine and perfect like the Old Testament," selected such a code from the Christian writings with which they were familiar—just as other men had previously selected the Old Testament itself from the national literature of Israel.

This third view is entirely consistent with the second if we may understand by it merely that these men set apart the books which, from the time of their publication, had been received as scriptural, so as to secure for them a more distinct and uniform recognition. And it is only in this sense that we can acknowledge it to be true. The so-called framers of the Canon framed it merely in the sense of pronouncing an historical verdict, based upon investigation, as to what books had from the first been accounted scriptural. If canonicity be deemed identical with scriptural character, then the Canon was complete to date as fast as the books were written, and was finally completed at the same moment with the latest book. It follows from this that it was complete much earlier than the dates above assigned, and that the three divisions of the Old Testament are not three successive instalments of the Canon, but are merely a classification of it.

This difference of view has already been stated in the article BIBLE in this work. We here present some further considerations on the same side of the question.

1. *The habitual claim* of the men and the councils that are said to have formed the Canon is that their work was a process of historical inquiry. They uniformly ask, not whether a book shall now be admitted into the Scriptures, but whether it has hitherto been regarded as scriptural. In the case of the New Testament no one disputes that "apostolic origin was the chief" among the grounds for their affirming the canonical authority of a writing. It is also correct to assert that the prominent reason for engaging in this work was "the necessity of meeting heretics with their own weapons, in their own way, with *apostolic records* instead of oral tradition." In the nature of the case it would not have answered their purpose to say, Here is a writing which we will henceforth receive as apostolic or as otherwise of divine authority. They must needs say, This is one of the writings which has always been received as apostolic or as otherwise divine. As a matter of fact, this is what they actually said in such cases, as will be admitted even by the men who dispute the truth of the claim they thus made. The same holds in the case of the Old Testament. For example, the famous verdict of Akiba in the Council of Jamnia was, "No one in Israel has ever doubted that the Song of Solomon is canonical" (*Iadayim*, iii. 5).

2. *The evidence commonly alleged against this claim is inadequate.* Of course there is no absurdity in supposing that the claim may be fraudulent, or a merely conventional way of describing an innovation as if it were a fact of history; but that it is so no one has a right to assert until he can prove it. But in proof,

curiously enough, not a particle of direct evidence seems to be alleged. The claims of the books were publicly discussed throughout the whole of the Canon-making period. The case against some of them was fully argued on the ground that their claims were mistaken. But have we any account that any such claim was disputed in those days on the ground of its not being made in good faith? Did any opponent ever reply, His assertion that the book was received in the past is only a fictitious way of asserting that he thinks it ought to be received in the future? If this sort of fiction was then being habitually practised, somebody must have known it, somebody must have tried to expose it. Some trace of the exposure must have been handed down in the voluminous controversial literature which has come down to us. This is a case in which the argument from silence is clearly of great weight. Unless there is some direct proof that these claims were fraudulently or conventionally made, we must hold that they were made in good faith, and are to be understood in their natural meaning. Will any one venture to say that there is any such proof? The fact that the claims were disputed seems to be principally relied upon for showing that they were either fictitiously made or else mistaken. But a glance at the article under consideration will show that they were disputed, not merely up to the close of the second century A. D., but in the third century and the fourth, and in every century since. The disputes, too, have been largely over the same books and with the same arguments. If this fact proves that the books have not been received from prophetic and apostolic times, then it proves that they were not received in the second century, and have never been received.

Certain particular facts are adduced. For example, it is said concerning the New Testament: "The collection of writings was not called *Scripture*, or put on a par with the Old Testament as sacred and inspired, till the time of Theophilus of Antioch (about 180 A. D.)." But no proof of this would be alleged except from silence; and the silence, in this case, is not at all decisive, since it is that of a small body of literature which had no particular reason for mentioning the matter. For anything we know, the collective New-Testament writings may have been habitually called *Scripture* long before the date mentioned, even if they do not happen to be called so in the extant literature of that period. But the silence itself is by no means unbroken. It is true that the apostolic Fathers often cite the facts mentioned in the New Testament rather than the books, and that they may have obtained the facts from tradition. But it is also true that Clemens Romanus, Ignatius, and Polycarp mention the Epistles to the *Corinthians*, the *Ephesians*, and the *Philippians*; that Papias mentions the Gospels of *Matthew* and *Mark*, and is familiar with that of *Luke;* and that from the middle of the second century we find frequent mention of the different books and of collections of them. It is also true that the New Testament was written by men who were familiar with the Old Testament and with the scriptural character which it possssed, and that these men claim religious authority for their own writings, (*e. g.*, John xx. 31; 2 Thess. ii. 15; iii. 14). And, apart from all particular claims, the whole structure of these writings is that of authoritative utterance. Apparently for this reason pains are taken in authenticating them (2 Thess. iii. 17). They are to be read and circulated, to all appearance, in the public religious assemblies like the Old-Testament books (Col. iv. 16; 1 Thess. v. 27). In 2 Pet. iii. 16 the Epistles of Paul at least are certainly put on a par with "the other Scriptures." And when we have thus established the fact that the apostles professedly taught Christianity by means of Scriptures of their own writing, we can hardly avoid the conclusion that the foundation of the apostles and prophets (Eph. ii. 20; 2 Pet. iii. 2) is one which includes the apostolic and prophetic Scriptures.

The assertion is made that "The individual who first gave public sanction to a portion of the national Jewish literature was Ezra, who laid the foundation of a canon. . . . The public authority he conferred on the Law is the first step in the formation of the Canon." But, waiving all questions as to what Ezra had to do with the origin of the Pentateuch, and therefore all questions as to the extent of the Law previous to his time, the evidence at least shows that the Law was in existence in writing, was used for purposes of authoritative appeal, and was, at least to some extent, identical in its contents with the older parts of our present Scriptures. If, therefore, the conferring of public authority on the Law is the first step in the formation of the Canon, then this step had been taken centuries before the time of Ezra. Indeed, by this definition the book of Ezra ascribes to him no canon-making whatever, for it speaks of him as the scribe of the Law, and not as its author. Its origin is indicated when it is called sometimes the Law of Moses and sometimes the Law of the God of the heavens. If the conferring of public authority upon writings which claim to be the divine law is the beginning of the Canon, then the Scriptures themselves claim that the Canon began at least as early as Moses, and reached its final dimensions by a process of growth which extended through the centuries.

3. *If the work of collecting the canons was one of simple historical inquiry, its results are thereby accounted for.* On any theory, the Canon of the Old Testament did not include all the Israelitish literature, nor that of the New all the Christian literature, extant in those times. On the theory of a comparatively recent selection, "if it be asked on what principle books were admitted, it is not easy to answer." This conceded difficulty in answering grows as one studies the subject, and constitutes a grave objection to the theory in which it inheres. But on the hypothesis that the collectors did simply what they professed to do, the difficulty has no existence. To use the terms of the evangelical theology, the same inspiration which produced the writings accredited them to the generation among whom they were produced, so that afterward the question what writings had been received as thus accredited was merely a question of historical evidence. Or, leaving out the theological terminology, the same influences which gave the writings their peculiar character caused each of them to be recognized in that character from the time when it first became known.

4. *Many important phenomena*, inexplicable on the other theory, confirm the view now advocated. Of Josephus, for example, we are told that "we learn nothing from him of its history, which is somewhat remarkable, considering that he did not live two centuries after the last work had been added. The account of the Canon's final arrangement was unknown to him." If we state the facts more precisely, the case becomes still more remarkable. Josephus was a man in the prime of life when the Council of Jamnia was held. If his acquaintances were busy in making up a third Canon by setting apart our present Hagiographa from the profane company they had hitherto

kept, or in revising such a Canon which some one had previously made, Josephus must have known it. But he betrays no consciousness of any such knowledge. The supposition that he had such knowledge is inconsistent both with the plain statements he makes and with his whole use of the sacred writings. In a celebrated passage (*Cont. Ap.*, 1–8) and elsewhere he affirms that all the Old-Testament books had then been recognized as having a peculiar sacred character for about five hundred years. The threefold division which he gives is so far from showing that the Hagiographa is a third Canon that it seems to prove that our *present* division of Prophets and Hagiographa had not then been made.

The theory of an Alexandrian Canon of the Old Testament, different from that which prevailed in Palestine, belongs with that of a Canon selected at a late date and fictitiously maintained. On the other theory, the Old-Testament Apocrypha are *midr'shim*, and not Scripture.

To mention but one more particular: the theory of a difference in sanctity between the different parts of the Old Testament is closely connected with the selection-theory of the Canon. But there is no trace of any such difference in the New Testament or its contemporaneous literature, and very little trace of it even for some time after. On the other hand, the sanctity of many of the Psalms, of Job, and of other parts of the Hagiographa is historically known to have been recognized long before the time of Ezra or the writing of many of the prophetic books. So far as we have evidence, the phenomena are just the reverse of what we should expect if the books were brought together by a late selection and recognized as sacred by reason of their having first been recognized as canonical.

Among recent noteworthy works on the Canon are Samuel Davidson's *Canon of the Bible* (London, 1878; 3d ed. 1880); the articles on the "Canon," by H. L. Strack and Woldemar Schmidt, in the *Schaff-Herzog Encyclopædia of Religious Knowledge;* Edward C. Mitchell, *The Authenticity, Canon, and Text of the Greek New Testament* (Andover, 1880); A. H. Charteris, *Canonicity* (1881); J. J. Given, *The Truth of Scripture in Connection with Revelation, Inspiration, and the Canon* (Edinburgh, 1881). (W. J. B.)

CANON, IN MUSIC. The harmonic canon of the mathematicians was commonly referred to in ancient times to prove the consonance or dissonance of notes differing only in pitch. Those musicians who thus appealed to the canon, or rule, were called *Canonici*. The terms "Canon of Pythagoras," "Canon of Euclid," etc., refer to the particular modes of dividing monochord employed by these philosophers. Musicians who followed Aristotle and Aristoxenus (who made the ear the sole judge of consonance and dissonance, and their own usages their laws) were called *Musici*. Similar opposing parties also existed in the various Oriental nations, and are found now among ourselves. Hence the idea of the "music of the spheres," and Aristotle's glimmering notion of a keynote as a kind of central sun, in that it is of superior importance, and many similar singular fancies. The science involved in the various theories for the calculation of intervals by dividing a monochord was called *Canonike*. The "section of the canon" of Ptolemy determines the divisions of the octave that constitute our modern major scale. Modern musicians generally employ logarithms in calculating very small intervals or slight variations in larger intervals.

Musical canons are compositions constructed with rigid conformity to law or rule as regards form. A round or catch best illustrates the essential principles of the canonic form, although canons are generally much more extended and highly developed, and require greater mental powers for their projection. The well-known round "Three Blind Mice," in which the three singers respond to each other by repeating the same notes a few moments later, may be called an extremely simple form of a canon, three in one, in the unison. If the composer had employed eight voices instead of three, it would be called eight in one. When, instead of singing exactly the same notes, the singers repeat the same melody at another pitch, the canon is said to be in the fourth or fifth, or whatever interval happened to be chosen, instead of "in the unison." When there are two melodies and four singers, the canon may be a duet-canon or a duet of canons, and at any intervals. Canons vary, therefore, in the number of voices and melodies heard simultaneously, and in the pitch of the responding voices.

In some canons the melodies are very slightly modified as regards intervals; in others the melodies or their repetition are sung quicker and slower (*by augmentation* or *diminution*), or are inverted; *i. e.*, the responding voices measure the required intervals downward instead of upward, or the reverse. In a canon by retrogression the responding parts repeat the notes of the melody backward.

There are many forms of canons in general use, but these are the most commonly found. Canons form a highly valuable mental gymnasium for the exercise of musical students. For several centuries English composers prided themselves greatly in being masters of this style of construction. The earliest specimen of part-writing extant is in canonic form. Possibly on account of the difficulty of finding copyists, in olden times composers planned canons in such a manner that the music was written out for one part only, signs being placed at the points where the answering voices entered. These were called "enigmatical canons," for sometimes the points were misplaced or omitted altogether. Modern musicians have put forth highly interesting canons in many different varieties, often showing marvellous artistic skill. Sometimes accompanimental parts that are less strict in structure are added to enhance the general effect. "Non Nobis Domine," by Byrde (1538–1623), which is commonly sung as "Grace before and after meat" by bodies of learned men in England when they dine together, is in the form of a canon, three in one, in the fifth octave below. (S. A. P.)

CANON CITY, the county-seat of Fremont co., Col., is on the N. bank of the Arkansas River, a few miles below the Grand Cañon of the Arkansas, and on the Denver and Rio Grande Narrow-gauge Railroad, 45 miles W. N. W. of Pueblo. It has a bank, a weekly newspaper, good hotels, seven churches, good schools, a military college, and the State penitentiary. It is a resort for invalids, having soda springs, hot and cold; has abundant water-power, and is surrounded by mines of gold, silver, copper, lead, and mica, as well as stone-quarries and lime-kilns. Petroleum and lignite are also found here. Population, 3820.

CANON WREN, an oscine passerine bird of the genus *Catherpes* and family *Troglodytidæ;* there is but one species, *C. mexicanus*, with two varieties, *C. m. conspersus* and *C. m. punctulatus*, inhabiting the Southwestern United States and southward. The bill is remarkably slender, with a peculiar axis, nearly in line with that of the frontal region of the skull; the tarsus

shows a tendency to subdivision of the lateral plates, a character very exceptional in *Oscines*. The cañon wren is 5 or 6 inches long; the wing, $2\frac{1}{10}$ to $2\frac{8}{10}$; the bill, $\frac{3}{4}$ to 1; the upper parts are brown, paler and grayer before, rich and rufous behind, everywhere dotted with whitish and with dusky specks; the fore underparts are pure white, shading behind through tawny brown into rich mahogany-color; the tail cinnamon-brown, fully black-barred. The varieties mentioned only differ a little in size and tint. They inhabit rocky and precipitous places, and are famous for the volume of their rich ringing notes; the eggs are laid in a nest in a rift of the rocks or other nook, to the number of five or more, and are crystal-white, sprinkled and blotched with reddish-brown. (E. C.)

CANOSSA, a village of Northern Italy, in the province of Modena 11 miles south of Reggio. On the adjoining mountain are the ruins of a castle destroyed by the people of Reggio in 1255. It was the scene of one of the most memorable events of mediæval history. Here Henry IV., emperor of Germany, humbled himself before Gregory VII. The reforms which this pope had instituted in the Church were a direct blow at Henry, under whom simony had flourished, but the emperor did not openly resist until he himself was cited to appear for trial at Rome. A diet was then held at Worms (Feb. 22, 1076), at which Gregory was declared to be deposed on the ground of tyranny and various crimes. As soon as he was notified of this action, Gregory replied by excommunicating all the bishops who had attended the diet and solemnly excommunicating and deposing the emperor. His subjects were absolved from their allegiance, and steps were taken to confer the imperial dignity on Rudolf of Suabia. Henry, forsaken by his recent supporters, was obliged to submit. In the depth of winter he hastened across the Alps and climbed the ridge to the castle of Canossa, then belonging to Matilda of Tuscany, where the pope had sought refuge while still uncertain of the emperor's object in coming to Italy. For three days (Jan. 25–27, 1077) the once haughty emperor was obliged to wait in the outer court. Clothed in a penitent's coarse shirt, with bare head and feet, he begged to be admitted to the pope's presence that the dreadful sentence of excommunication might be removed. At length he was received and restored to the Church, with the express condition that he should not resume the imperial dignity until the case had been still further examined. The triumph of the pope was complete; he had not only freed the papacy from the patronage of the emperor, but he had reversed their former condition, and shown to the world an example of the submission of the highest temporal sovereign to the exactions of the ecclesiastical power; and, though his victory in this particular case was not lasting, though Henry again dared to resist, and even drove the pope to die in exile, the scene at Canossa remained typical of the victory of the Roman Church in its struggle with the sovereigns of Europe. It was forcibly recalled by Prince Bismarck during his contest with the ecclesiastical authorities and their supporters when Pope Pius IX. declined to receive Cardinal Hohenlohe as the German ambassador at the Vatican. In the debate which followed in the German Parliament (May 14, 1872) the imperial chancellor, turning suddenly to the Ultramontane members, exclaimed, "Of this you may be sure: we are not going to Canossa;" and the words became in a few days a popular cry.

CANOVAS DEL CASTILLO, ANTONIO, a Spanish statesman, was born at Malaga in 1830. He received his education at Madrid, where he took courses in philosophy and jurisprudence, and entered upon a literary career. In 1852 he was elected to the Cortes by the city of Malaga; in the same year he performed the functions of minister of the interior, and two years later was made chargé d'affaires at Rome. During this period he aided in preparing the concordat between Spain and the Holy See. In 1861 he was appointed under-secretary of state, and in 1864 received the portfolio of minister of the interior as a member of the Mon cabinet. In the subsequent O'Donnell cabinet, formed June, 1865, he was minister of finances and of the colonies, in which position he presented to the Cortes the project of a law for the abolition of negro slavery. He was banished shortly before the revolution of September, 1868. In the constituent Cortes, of which he was a member, he combated the formation of a democratic constitution and favored the restoration of the Bourbons. He was one of the chiefs in the movement which brought Alfonso XII. to the throne. He became, in December, 1874, president of the regency ministry, and after the accession of the new monarch he remained at the head of the cabinet. He retired in September, 1875, but was recalled to the presidency of the council in December of the same year, and charged with the direction of the first legislative elections of the new régime. He was himself elected to this new Cortes by the city of Madrid in January, 1876. King Alfonso conferred on him the order of the Golden Fleece. His historical and literary labors also gained him admission in 1867 into the Spanish Academy. In 1879 he again became prime minister, but resigned in March of that year, to be recalled on December 9th to form a new ministry. He again resigned in February, 1881, before the strong opposition of the Liberals and remained in retirement until July 4, 1890, when he again became premier.

CANROBERT, FRANÇOIS-CERTAIN, a French marshal, was born at St. Céré, Lot, June 27, 1809. He served several campaigns in Algeria, became a colonel in 1847, a general of brigade in 1850, and general of division in 1853. In the Crimean War he led a division at Alma, September, 1854, and succeeded Saint-Arnaud as commander-in-chief in the same month. The allied armies then besieged Sevastopol, and defeated the Russians at Inkerman, Nov. 5, 1854. He resigned the chief command in May, 1855, returned to France, and was made a marshal of France in 1856. In the war against Austria he commanded a corps at Magenta and Solferino, June 24, 1859. He commanded in 1870 an army corps in the Franco-German War in several battles around Metz, and was shut up in Metz with Bazaine. Having been taken prisoner in October, 1870, he was detained some months in Germany. After the fall of the Empire he continued to be a Bonapartist, and was elected a senator in 1876 for the department of Lot. He was re-elected in November, 1879.

CANTICLES, BOOK OF. The article in the ENCYCLOPÆDIA BRITANNICA rejects all the allegorical interpretations of this book and regards it as an ancient Hebrew love-poem. No fault is to be found with this view. But on this theory the very simplest interpretation is the best, and the simplest interpretation makes the book an idyl of monogamic married love between the Shulamite and her husband. So far as Solomon is concerned, whether we regard him as the husband of the Shulamite or not, we have here an ideal mar-

See Vol. V. p. 29 Am. ed. (p. 32 Edin. ed.).

riage—a condition of things which might have been, pictured in contrast with the magnificence of his harem and all the luxuriousness which surrounded him, and making the latter seem pitiful by comparison. And there is no ground for any of the interpretations which represent the Shulamite as either accepting or repelling unlawful and indelicate attentions on the part of any one. The alleged expressions of sensuality are merely instances of mistaken exegesis. For example, the Shulamite compares her husband in the daytime, when he is abroad attending to his affairs, alert and vigorous, to an antelope bounding over the mountains. She compares him when he is at home at night to the antelope quietly feeding by night among the lilies at the edge of the water. This figure, and allusions to it, are several times repeated. The interpretation which understands these passages as parallel to certain passages in Swift or Sterne or Lord Byron is unworthy, and is as far as possible from the meaning of the original. There is no occasion, therefore, to defend the book against these interpretations by guessing, in contradiction to all the evidence, that the passages in question are interpolated corruptions of the text.

The fact that some Jews, as late as the close of the first century A. D., were in doubt as to the canonical character of the book, does not show that up to that time it had been omitted from the Old-Testament Canon, and therefore had been more subject than the other books to a change of text, but rather that, though it had always been regarded as scriptural, it had yet been less used, and was consequently less known, than some of the other books. (See BIBLE.)

Moreover, if we regard the book as a simple idyl of married love, we do not thereby deny its right to claim a place in the Canon on the ground of its religious character. Perhaps its merely ethical teachings as to love and marriage would constitute for it a sufficient claim; but its title is not restricted to this ground alone. The pure but eager and whole-hearted love in marriage in its highest type is the best possible illustration of certain aspects of the love which ought to exist between God and man; and this use of the book of Canticles should be promoted, and not hindered, by the realistic interpretation now current.

It has been inferred from the mention of Tirzah in Cant. vi. 4 that the book was written while Tirzah was the capital of the kingdom of Israel under Baasha. But it appears from 1 Kings xiv. 17 that Jeroboam also lived at Tirzah. In the account given in the Vatican copy of the Septuagint in the long added passage found after 1 Kings xii. 24 this name appears twice, indisputably, as *Sarira*. The same account affirms that Jeroboam, in the days when he was the servant of Solomon, built for Solomon "the Sarira in the mountain-country of Ephraim," as well as the fortifications at Jerusalem. Now, it is commonly said that this particular Greek copy also gives Sarira as the equivalent of Ts'redah, the birthplace of Jeroboam. This might easily be otherwise explained. But even if it be true, the Sarira in Mount Ephraim, the city from which Jeroboam's wife went to Shiloh and returned, must have been Tirzah, and not Ts'redah. According to this account, therefore—which certainly has some historical validity—Solomon built Tirzah, employing the same man to direct the work whom he employed in similar services in Jerusalem. The view, therefore, that Solomon is the author of this book not only accounts for the prominence with which Tirzah is here named, but also for the mentioning of Tirzah in connection with Jerusalem. This latter point is very difficult to account for on the theory that the poem belongs to the times of Baasha or Omri, for the relations between Tirzah and Jerusalem were then not such as would lead any one to mention them both lovingly in the same breath.

But independently of this branch of the evidence, most scholars think that they have sufficient proof that Solomon was the author of the Canticles. In the introduction to Green's translation of Zöckler's *Commentary on Canticles* in Schaff's edition of Lange is a full and successful discussion of this question by the author and the translator, including a summary of arguments by Delitzsch and Hengstenberg. The following extract gives a general idea of the nature of the proof of the Solomonic authorship of the book: "That Canticles was composed in the age of Solomon as the flourishing period of the Old-Testament Chokmah literature may be argued not only from manifold indications of the affinity between its ethical tendency and view of the world and those of Solomon's collection of proverbs, but chiefly from the certainty with which its author deals with all that is connected with the history of the Solomonic period; the exuberant prosperity and the abundance of native and foreign commodities, whose existence he assumes in Israel at that time, and the remarkably rich round of figures and comparisons from nature which is everywhere at his command in his descriptions. And that this author is no other than Solomon himself is shown by the extensive knowledge which he exhibits throughout the entire poem of remarkable and rare objects from all of the three kingdoms of nature, and by which he may be most unmistakably recognized as the wise king who was able to speak 'of trees, from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall; also of beasts and of fowl and of creeping things and of fishes,' 1 Kings v. 13 (iv. 33). Solomon's authorship is likewise confirmed by the equal acquaintance which the poet shows with all parts of the land of Israel; the easy and familiar way, indicating not only accurate knowledge, but royal possession and ownership, in which he speaks of horses in Pharaoh's chariot (i. 9), of wood from Lebanon (iii. 9), of the tower in Lebanon looking toward Damascus (vii. 5), of the pools of Heshbon and the forests of Carmel (vii. 5, 6), the tents of Kedar and the mountains of Gilead (i. 5; iv. 1), of the beauty of Tirzah and the loveliness of Jerusalem (vi. 4; cf. iv. 4), etc. The peculiarities of the language of the poem, rightly estimated, likewise testify rather in favor of than against Solomon's authorship. For the Aramæisms and apparent traces of later usage which it presents are, like similar phenomena in the Song of Deborah, in the book of Job, in the prophet Amos, etc., to be attributed entirely to its highly poetical character. And the occurrence in individual cases of foreign non-Semitic words (*e. g.*, פַּרְדֵּס, iv. 13; אַפִּרְיוֹן, iii. 9), if this were actually proven, would be least surprising in a writer of such many-sided learning and of so universal a turn of mind as Solomon. And, finally, the contents of the piece are of such a nature as not only to admit, but actually to favor, the supposition that Solomon is the author, provided that in ascertaining these contents we discard the common assumption of the profane erotic exegesis that this king is introduced as the seducer of the innocence of a country maid, who adheres with steadfast fidelity to her betrothed." (W. J. B.)

CANTON, a city of Fulton co., Ill., is on the divide between the Spoon River and the Illinois River, 28

miles W. S. W. of Peoria, and at the intersection of the Buda branch of the Chicago, Burlington, and Quincy Railroad and the Peoria division of the Wabash, St. Louis, and Pacific Railroad. It has three hotels, three banks (one national), three weekly newspapers, seven churches, and five schools. It has a foundry, a factory, two flour-mills, and two large manufactories of agricultural implements. It was settled in 1831, and incorporated in 1849 with a temperance charter. Its property is valued at $1,000,000; its public debt is $2000, and its expenses for 1881 were $10,000. It is neat in appearance and lighted with gas. Population, 5589.

CANTON, the county-seat of Madison co., Miss., is on the Chicago, St. Louis, and New Orleans Railroad, 190 miles N. of New Orleans and 23 miles N. of Jackson. It has a bank, two hotels, a weekly newspaper, five churches, and good schools. It ships about 20,000 bales of cotton annually. Population, 2122.

CANTON, the largest town of Lewis co., Mo., is on the Mississippi River and on the Keokuk and St. Louis Railroad, 165 miles N. of St. Louis. It has a bank, two weekly newspapers, ten churches, graded schools, and the Christian University, under the control of the "Christian" denomination. It carries on an extensive trade, has two elevators, numerous warehouses, large saw-mill, three planing-mills, three flour-mills, and several manufactories. Population, 15,909.

CANTON, the county-seat of St. Lawrence co., N. Y., is on both sides of Grass River, 18 miles S. E. of Ogdensburg, and on the Potsdam branch of the Rome, Watertown, and Ogdensburg Railroad. It contains a court-house and jail, both built of Potsdam red sandstone, clerk's office of gray marble, three hotels, two weekly newspapers, an opera-house, six churches, a union school and an academy. It has also two foundries, two flour-mills, saw-mill, tannery, boat-factory, and smaller works. It is the seat of St. Lawrence University, which, besides departments of letters and science, has a Universalist theological school. Its library, founded by Silas Herring of New York, contains 10,000 volumes. The university has three fine buildings, one of which is a memorial hall of Rev. Ebenezer Fisher, D. D., the founder of the theological school. Canton was settled in 1800 by Stillman Foote, and incorporated as a village in 1845. Population, 2500.

CANTÙ, CESARE, an Italian historian, born at Brivio, in the Milanese, Dec. 8, 1807. At the early age of eighteen he was a professor of belles-lettres in the college of Sondrio in the Valtelline. Not long after he changed his residence, first to Como and then to Milan. He ardently embraced the liberal cause, and soon began to write in its behalf. In 1842–44 he published a work entitled *Reflections upon the History of Lombardy in the Seventeenth Century*, which drew upon him the disfavor of the existing government. He was condemned on the charge of conspiracy to one year's imprisonment. He utilized the time, however, in writing a novel called *Margherita Pusterla* and a number of poems, religious and political, in which he shows a devotion to liberty and great loyalty to the papacy, which he considered the principal factor in the redemption of Italy. Numerous articles in the *Biblioteca Italiana* and other journals are written in the style of the romantic school of Manzoni and Silvio Pellico. His principal work is a voluminous *Universal History* (1st ed. 1837; 9th ed. 1864). Its popularity was so great that many editions appeared in rapid succession in Italy, and it was translated at once into English, French, and German. As he disliked Voltaire and the French literati, he has depreciated France in this work, especially in the eighteenth century. In 1851 he wrote a valuable *History of Italian Literature*. Among his other works are a *History of the Last Hundred Years* (1864), a *History of the Italians* (1st ed. 1854; 2d ed. 1857–60), *The Italian Parnassus: Contemporary Italian Poets, Greater and Less;* and a poem, *Algiso; or, The Lombard League* (1828). He was admitted to a seat in the Vatican Council in 1869, and appointed its historiographer. Some of his fictions have been in part autobiographical. Although favorably known as a poet and a novelist, his chief claim to literary reputation is as a philosophic historian. Among his later works are *Gli Eretici d' Italia* (1867); *A History of Italian, Latin, and Greek Literature* (1863–64); *Cesare Beccaria e il Diritto Penale* (1864); *Chiesa e Stato* (1867); *Dell' indipendenza italiana* (1870); *Reminiscenze su Alessandro Manzoni* (1882). (H. C.)

CANVAS-BACK, a kind of duck of the family *Anatidæ*, sub-family *Fuligulinæ*—the *Fuligula vallisneria*, sometimes placed in the genus *Aythya*, sometimes also made type of a distinct genus, *Aristonetta*. The specific name is derived from the "wild celery," *Vallisneria spiralis*, of which the bird is especially fond, and from feeding upon which its flesh acquires the peculiar flavor so well relished by gourmands, the name of the hydrocharidaceous plant itself being derived from that of Antonio Vallisneri, an Italian naturalist (1661–1730). This kind of tape-grass or eel-grass grows in most parts of the United States and many other countries; it is abundant in Chesapeake Bay, which is consequently the winter resort of great numbers of canvas-backs. The bird is about 20 inches or so in extent of wings; the wing, 10; tarsus, 1¾; the bill, 2½ or more, measured along the culmen, with median nostrils. The size and shape of the bill are the principal specific characters in comparison with closely-related *F. americana*, or red-head duck, which is not seldom sold and eaten as the canvas-back. In *F. vallisneria* the bill is not shorter than the head, narrow and nearly parallel-sided throughout, and very high at the base, where it rises with a long, gentle slope in line with the forehead. In *F. americana* the bill is shorter, wider, lower, and meets the forehead out of line with the great convexity of the latter; the nostrils are sub-basal; the bill is also bluish, with a black belt near the end, whereas in the canvas-back the bill is dusky throughout. The male canvas-back has the head and upper part of the neck dark chestnut, much obscured on the head with dusky; the back ashy-white, finely rayed transversely with narrow, broken, and zigzag lines of blackish, from the effects of which vermiculation comes the name; the lower neck, breast, flanks, and crissum blackish; the wing-speculum slaty-bluish; the feet dark slate; the eyes red. In *F. americana* the back is mixed silvery-gray and blackish in about equal amounts, the dark lines being broader and not so much broken into dots; the effect is thus different. The head is bright chestnut-red, with a coppery lustre. The female canvas-back is smaller than the male, and has the head plain dark snuff-brown, but may be recognized by the shape of the bill and other characters. The canvas-back inhabits North America at large, but is particularly abundant along the Atlantic coast of the United States; it breeds chiefly far north, but certainly also down to the northern border of the United States at ordinary elevations, and still farther south in alpine localities. The flesh is

not specially excellent under ordinary circumstances. The bird feeds upon the root of the *Vallisneria*, which is procured by diving for it and pulling it out of the mud. It is frequently the unwilling purveyor of the widgeon and other ducks equally fond of the wild celery, but unable to dive for it. Immense numbers of the birds are annually destroyed for the markets by professional gunners as well as by amateur sportsmen, the pursuit of this water-fowl being an extensive industry, systematically pursued under various regulations and restrictions, the object of which is to prescribe methods of taking the birds, and thus prevent wholesale destruction by the poachers, who use floating batteries and other contrivances by which the game is unduly harassed on its feeding-grounds. "Toling" is another method by which the birds, though they do not fly to a decoy, may be allured toward the shore by the display of some unusual object. Wing-shooting is the sportsman's method, practised from blinds or screens.

(E. C.).

CAPE GIRARDEAU, a city of Cape Girardeau co., Mo., is on the Mississippi River, 150 miles below St. Louis and 40 miles above the mouth of the Ohio River. It is the terminus of the Cape Girardeau and Southwestern Railroad. There are three hotels, one bank, three weekly newspapers (one in German), eight churches, and six schools. St. Vincent's College, a Roman Catholic institution, was established here in 1844, and there is also a State normal school, which is well attended. The industries comprise one foundry, three stave-factories, five flour-mills, and a paint-mill. The first settlement was made in 1794, and in 1824 it was incorporated as a city. Its property is now valued at $600,000; its public debt is $119,600, and its expenses for 1881 were $10,000. Population, chiefly of German origin, 4288.

CAPEL, THOMAS JOHN, an English divine of the Roman Catholic Church, was born at Hastings, England, Oct. 28, 1836. At the age of fifteen his education was continued by Rev. J. M. Glenie, under whom he studied for six years. In 1854 he become one of the founders and vice-principal of St. Mary's College, Hammersmith. Here his health broke down from severe work, and in 1858 he went to the Continent to recruit, shortly after having been ordained by Cardinal Wiseman. During his absence he established an English Catholic mission at Pau, and was appointed its chaplain. Having regained his health, he returned to London, where he gained great reputation by his oratorical powers and attracted overflowing congregations. He was afterwards appointed chamberlain, and in 1873 domestic prelate, to the pope, with the title of monsignor. During the Œcumenical Council at the Vatican he delivered a course of lectures which drew immense audiences. In 1876 he gave a similar course with equal success. In 1873 he established the Catholic public school at Kensington, London, and was afterwards appointed rector of the Roman Catholic University College at Kensington. His sermons are particularly devoted to the exposition of doctrinal points, and he has made many converts to his Church from all classes of society.

CAPE MAY, a city and famous watering-place of Cape May co., N. J., at the southern extremity of the State. It is the terminus of the West Jersey Railroad, 81 miles S. of Philadelphia, and has also in summer a line of steamboats. It has gas-works, water-works, two local railroads, two weekly newspapers (which in the summer issue daily editions), six churches, public and private schools, and good drainage. During the summer it has hotel accommodation for 8000 guests. It is one of the oldest seaside resorts in the United States, and was incorporated as a city in 1855. It has had numerous fires: in 1855 the immense Mount Vernon Hotel was destroyed; in 1869, seven hotels were burned; and in 1878, fourteen hotels and buildings, covering an area of 40 acres, were destroyed. Since 1879 it has had a paid fire department. During the summer the population exceeds 10,000. Resident population, 1699.

CAPIAS, in law, a writ issued in civil cases commanding the sheriff to take the person of the defendant into custody.

A *capias ad respondendum* is the writ which was formerly used to begin almost every personal action. In very early times it seems that the person of a defendant in a civil action was not liable to arrest except where the injury complained of was accompanied with force and amounted to a breach of the peace. By stats. 52 Hen. III. c. 23, 13 Edw. I. c. 11, 25 Edw. III. c. 17, and 19 Hen. VII. c. 9, however, this immunity was done away with, and a capias became in consequence the usual writ in all civil actions, even though they sounded exclusively in contract. In order, however, to entitle the plaintiff to this writ of capias it is almost universally required that he should make affidavit of his cause of action. The defendant when arrested under a capias will only be discharged on giving satisfactory bail for his appearance, which must usually be approved by the court.

A *capias ad satisfaciendum*, or, as it is usually termed, a *ca. sa.*, is a writ in the nature of a writ of execution issued after the obtaining of the judgment. It directs the sheriff to secure the person of the defendant and to imprison him until the amount of the judgment is paid. The effect of the issuing of a *ca. sa.* is at common law to prevent the suing out of any other process of execution against either the lands or chattels of the defendant. This rule is, however, modified in modern days in some localities by statute.

By stat. 1 & 2 Vict. c. 110, and by many subsequent acts of Parliament, the use of writs of capias has been in England almost altogether done away with. By stat. 32 & 33 Vict. c. 62 it is provided that except in certain rare cases therein specified no person shall thereafter be arrested or imprisoned for making default in payment of a sum of money, and further, that no person shall be arrested on mesne process in any action unless the plaintiff shows to the satisfaction of the court that he has a good cause of action for £50 or over, and that there is good cause to fear that the defendant is about to leave the country to the plaintiff's prejudice. Provision is, however, made for the punishment by imprisonment of all fraudulent debtors alienating, destroying, removing, or concealing their property.

In the United States writs of capias—or, what practically amount to the same thing, warrants of arrest—are still allowable in all cases sounding in tort or where the defendant has been guilty of fraudulent conduct. The plaintiff cannot, however, where the real gist of his action lies in contract, entitle himself to a capias by electing to bring an action in tort.

Other forms of the writs of capias were in former times occasionally used, but have now become obsolete. Such were the capias *ad audiendum judicium*, the capias *ad computandum*, the capias *pro fine*, the capias *utlagatum*, and the capias *in withernam*. (L. L., JR.)

CAPITAL has been extended in meaning until it

has become, not synonymous with wealth, but a differing form rather than a differing substance of social force. Wealth comprises all matter and all privilege useful to man. But these matters and these privileges may exist in a form useful to the individual owner only. A drove of bullocks grazing in the valleys of the Rocky Mountains before the opening of the Union Pacific Railway was an article of wealth. In crossing the arid deserts eastward to the market, though their skins and bones might remain, their exchange value would fall so low that it would not pay the cost of driving them over. This drove of cattle, which represents the early form of capital, illustrates the constant difference between wealth and capital. While the drove exists among the grasses of nature it has a certain value to the owner. Put it on a railway, or carry it along pastures where it can keep its flesh, and it becomes capital, an article of wealth which can be *told off by the head* or pass from hand to hand, the representative of value and the medium of exchange. The land on which the grass grew which nourished the cattle goes through the same social evolution. Useful to the owner while in its remote condition, it had yet no value as a means of civilization; when connected with a market or series of markets an acre of it might be bought and sold, might be made a basis of exchange in New York or London, and thus might become capitalized or told off into capital.

It is this essential social character of capital which escaped the notice of the early writers on political economy, and has been recognized but dimly since. Adam Smith classified wealth into stock in two divisions, the second of which should be capital. His first division of stock he then divides again, not quite clearly. His division of capital he analyzes into *fixed* and *circulating*. Notwithstanding all this classification, Mill pushes farther, saying, "The distinction, then, between *capital* and *not-capital* does not lie in the kind of commodities, but in the mind of the capitalist—in his will to employ them for one purpose rather than another; and all property, however ill adapted in itself for the use of laborers, is a part of capital as soon as it, or the value to be received from it, is set apart for productive reinvestment" (*Political Economy*, book i. chap. iv. § 1).

The continuation of these abstractions produced the curious fantasy of the *Wages Fund*, the dogma of productive and unproductive consumption, and other economical theories which cannot be reduced to the test of ordinary experience.

The French writers, with all their power of analysis, have not improved upon the English economical definitions of this word. Say departed from Smith's course, making *capital* the equivalent of the latter's *stock*. This was not a gain, for Smith and Matthews make *stock* the whole and *capital* a part, which is certainly a well-grounded distinction. McCulloch makes *stock* the genus and *capital* the species. These distinctions should not be obliterated, unless we replace them with clearer terms, something which shall make a more definite analysis; and the French have not done this. They introduced *fund* or *funds*, but that term only became more confused than "capital." And, finally, Larousse says the English should follow Smith, while "French economists must always use *capital* in two very different meanings, according as it is employed in common language or as a term of exact science." But there is nothing national or race-descended in the term *capital*. If there is anything natural and common to humanity, it is in the desire, use, and possession of worldly goods. Roscher treats it in a learned and thorough manner, but he adds no new principle. He disputes the statement of Karl Marx, that "capital is money which begets money. This opposes the true nature of merchandise, value, money, and circulation. This opposition benefits but one of the three men who transact business" (*Das Kapital*, p. 139).

The French say, "All our capitals, all our riches, spring from our faculty of accumulating, sparing, and preserving." We believe all economists agree in this feature of capital: abstinence or parsimony is an essential part of this particular form of wealth. It is a commodity or commodities saved to be applied to reproduction, as distinguished from those things which are consumed. The idea of the individual user or consumer seems to have been always present in their minds, and to have limited all the definitions of capital. But saving or consumption, while it affects wealth as such, affects capital not at all as distinguished from wealth.

Consumption may be needed to make wealth into capital. What drew our bullock out of the Rocky Mountains and converted him from idle wealth into active capital? Was it not the fact that somebody was waiting to eat him where bullocks were scarce and money was plenty? What is the best form of capital to-day? Every one will answer, A British consolidated 3-per cent., a United States 4-per cent., or any equally convertible Government security. Even Marx, whatever may be his notions of government, social order, and economical rights, would carry this form of capital to London, New York, Canton, or Capetown, rather than a bag of gold, a cargo of wheat, or a sack of diamonds. The bonds have all the value of the commodities, in that they will exchange for them at a trifling discount, or even at a premium, wherever civilization exists; and they have the additional value of the interest accruing besides. While the owner has been travelling his capital has been working, and its representative, the bond in his pocket, has been increasing. It represents more wheat, gold, or diamonds—balancing exchanges being equal—in Canton than it represented in London before the journey commenced.

This bond is not wealth in substance, but in limited amounts it is the best instrument of wealth humanity has ever invented. In essence it is the inverse, the absolute opposite, of wealth. Generally speaking, it is founded, so far as it has any relation to wealth or commodities, on saved products which have been consumed, fired away in cannon, eaten by armies, wasted in wars. It may represent a solid work of industry like the Suez Canal or the Union Pacific Railway, but as a rule Government bonds represent lost wealth and wasted products. Whatever it represents historically, in substance it is one; it is a social obligation. It is an obligation to pay, a debt, a piece of debit-credit, which must be met by future savings and abstinence. It differs from that wealth which is not capital in that it has not been saved, but will be saved; then its personation of wealth will be completed; it will be liquidated, paid, and destroyed. But it may be a more useful tool during its existence, it may create more actual wealth and commodities, than the plough creates in the same time, if it be put to the highest uses of civilization.

We can hardly conceive of capital in the modern sense without some form of credit entering into it. Credit is order well distributed. Negotiable paper, collectable accounts, bank deposits, bank or other circulating notes,—all these become admirable forms of capital in any civilized community. And we must observe that consumption enters into them all in different de-

grees, but with equal certainty. Why does a man carry a bit of paper money instead of the indestructible diamond if it is not that his immediate desire to expend may be gratified? The diamond is a more solid form of wealth, and is getting to be a highly convertible form. Why does the merchant or financier carry negotiable notes, mere personal securities, in his pocket-book, when he can have the security of land and solid buildings for his property? It is that he may have the privilege of converting this capital into other capital or commodities at the need of the market. It is true that the operation of the market is an exchange, and is simply commercial, but this exchange is prompted and impelled by a personal want and accumulation of wants, which is never absent from the transaction in its essential nature.

It is this process of transmutation of wealth and capital which brings capital into such close relations with labor, and even gives it a fancied antithesis to labor in all the discussions affecting it. We put aside barbarism, and wherever society exists there we find labor and capital working together; for they cannot work separately and they cannot exist separately in a civilized sense. Capital is the first social factor. Labor is the effort of an individual, but is none the less a social transaction. The laborer was so long considered a client, vassal, or feudalized dependant that many writers treat him still as a social dependant. Then they consider him a dependant who has been wronged, deprived of his own, and entitled to an especial reward in consequence. But neither labor nor the laborer created society. Society created him, and created the opportunity which continues his existence under the effort of labor. Whether he be born czar of Russia or the child of the meanest tenement-house in New York, he cannot escape the obligation to his swaddling-blanket. All his duties are social, all his rights are social. The man who uses a shovel to earn his daily bread did not invent the shovel. This tool was created through long generations of development, use, abstinence, consumption—the *social need*, in short, which has impelled every society, simple or complex, in its onward movement.

The wrongs of labor are many, and cannot be too carefully regarded by society. But they do not affect the essential, economical nature of capital any more than the bleeding stripes of the slave affect the color of the diamond which his oppressed labor draws from the mine. In America every laborer can, and most laborers do, possess themselves of capital. This is the only way in which the social balance can be righted if capital inclines it against labor. It is in the nature of capital to move; wealth may lie idle if the owner chooses that form of gratification. But capital must be put into the social current, and be held always subject to the want of one or many. It loses its nimble qualities, its faculty of being told off by the head at any time, unless it thus pulsates with the daily life and want of mankind. The laborer must move with it, and thus catch some of the social force which is engendered with every forward movement in the world's life.

This current of civilization, this in-and-out flow of capital and labor, which enters into all transactions, large or small, and which constitutes the daily business of life, must be formulated in a term which partakes of the nature of both. The banker and trader, the manufacturer and farmer, do not hold all the functions of the middleman. The employer, the French *entrepreneur*, is not the sole social agent in the intercourse of capital and labor. The hiring of labor or the selling of its products is a small part of the social business which is transacted in every movement of life, great or small. Whenever capital and labor are loosened, started, or employed a new product is created, and the old ones are destroyed in the process. This highly sublimated social process we term *capitalizing*, and the person who at the moment carries it forward is a *capitalizer*. One man does not always hold the function; no more is one man always a banker or always a laborer. It is a social function, and may in turn be put forth through many and varied individuals. Any farmer selling a bushel of corn, any laborer planting potatoes in his cottage-garden or depositing his earnings in a savings bank, becomes a capitalizer, with all the power which society, through its manifold wants, enshrines in capital.

The deeper thinkers among the Socialists have penetrated the fact that it is not the mere possession of property and wealth which institutes the inequalities among persons. They have desired to seize this social movement, this capitalizing, this whole ordered movement of capital and labor, credit and business—to establish in the state itself a power which should distribute absolutely to each individual all the benefits now intercepted by the social administrator, the capitalizer, who at each turn of society momentarily interprets the social want. It would be about as easy to catch all the rainfall, and distribute it more equally by artificial showers over the whole country, as it would be to reconstitute the present order of trade and employment and by bureau service and state manipulation administer the manifold wants of society.

The idea of profit worried Marx especially. The begetting by money, not only in usury, but also in trade and exchange, he considers to be wrong in substance. There can be only one person benefited by the present social movement of capital, while two are injured. It will be observed that he loses sight of the social nature of capital, which we have defined so urgently, and makes it a personal power, something inhering in the possessor. We cannot pursue this idea of Marx, but it ends logically in nihilism, financial, civil, social. All heredity, all limitations of marriage, all property, all profit in exchange, all governmental control except the immediate vote of an assembly, must be abolished in this system in order that equality may assume sway and each individual may have his own.

Proudhon devoted a powerful intellect to the solution of social issues. He declares that "capitals are tools inert in themselves." Less radical than Marx, he would have an association of producers and consumers, who by reciprocity and exchange of products would escape for ever the "domination of capital." Then would follow "abolition of exploitation in all its forms;" "gradual and pacific annihilation of the action of capital;" "creation of gratuitous credit;" "security and equitable reward of labor;" "emancipation of the proletariat." The form is different, but the social change is about as great as that advocated by Marx, in so far as capital is affected. It is government made easy, every man his own banker, every man his own employer and laborer, and all taught and managed by the state. But who would teach the teachers? Mill says pineapples are needless; so is the third slice of bread at a meal. Two slices would sustain existence, but many find life easier if they commute the third slice into pineapple. Others like to wear jewelry, and who shall say that either is wrong in the social scale?

Public sentiment may change the use and distribution of wealth through ethics. The American Revolution destroyed the tea—which was capital—in Boston harbor. A "higher law," as it is called, came in and superseded the economic law. After King George and the rebels were reconciled, after the moral disorder ceased, tea became useful again. It was the same pound of tea always, but the social mood changed its value and power.

Society acts ethically through public sentiment, but it has no economical interest in the use an individual makes of his wealth or capital. The bottle of brandy which intoxicates a human brute sells at the same price with that which rescues an invalid from death. In order that the social movement may go on and capital be created and re-created, it is essential that there be consumption, as we have shown. Brandy may be used well or ill, but it can never be other than a good substance of wealth, a good form of capital, economically considered. It is a certain value in exchange; a runlet of brandy carried into any part of the world will have a more certain value than a sack of wheat.

The antithesis of labor and capital is wholly artificial, if we consider the social energy of capital as above stated. It is not that there is any particular fund devoted to labor, but because all individual members of society participate, through the power of the market, in the social movement which creates, nourishes, and forwards capital. The owner might have kept his bullocks in the Rocky Mountains to gratify his whim or greed. They might die amid an over-abundance of cattle, and thus do the world no good. The moment they became capital, convenient and commodious, the world was better fed. If calicoes are abundant, the laborer gets more of them. If tobacco advances in price, more is planted and his pipe is soon filled more cheaply. More capital means more commodities—a greater return to each member of society, whatever the rate of wages may be.

Capital increases, in money first, then interest lowers, production is stimulated; products—commodities—multiply, prices lower, consumption extends. This is true in principle, and it is true in historic fact. Wherever any thrift has been exercised consumption has extended to more and more individuals in the great community of society. It is not peculiar to any class of individuals. Capital is not a creature devouring society, nor are capitalizers—creators of capital—monsters preying on the other members of society. The commodity is always the same—bread, brandy, or gold—while the individual capitalizers are social agents, imperfect fellows, construing in a faltering way the social wants they see around them, and which become the breath of their nostrils. The Rocky Mountain grazier did not eat any more beef because the bullock was converted into capital; neither did the butcher in Liverpool nor did Rothschild, who furnished the exchange in London, the magnet which drew the bullock across the seas. No one of the party could eat more than one beefsteak, however his so-called capital, "the share of the capitalist," might increase. Rothschild out of his profits bought a diamond perhaps, but that did not increase the price of the steak sold in Liverpool or Manchester. Capital is created out of individual wants, organizing through highly-trained individuals—not mere employers and traders, but social agents—into social wants.

In order to forward and complete this process we must give the individual free play in his wants, or we shall not get the full economic power of capital, although we may have sluggish and inert wealth. The best social order ensures wealth most surely, and still more stimulates the creation of capital, the servant of both wealth and labor. Capital surely increases the means of communication, and laborers, using these improved travelways, now find their best opportunity. Poor as the United States was three-quarters of a century since, the French economist Coquelin saw that its more active employment of capital and credit would give it the advantage over richer England and France. The result has justified his sagacity. Civil order, the freedom of the individual, elastic capital,—these are the effective elements of modern wealth. Out of these factors comes the social movement we have sketched.

We close with the following summary:

1. Capital is a part of wealth, the more fluid part.
2. Capital is convertible value, that part of society's substance which is available for any want.
3. Capital is a social substance, which, combining with labor through a social agent, creates a new substance in accord with the desire of society. (W. B. W.)

CAPITAL PUNISHMENT is the taking, by due process of law, of the life of an offender as a punishment for the commission of a public offence. Formerly, nearly all offences, except very slight ones, were punishable, in England, with death, and sentence thereof was imposed, though in very many cases a commutation to imprisonment was granted by the Crown. This rendered the administration of criminal justice very uncertain, as courts and juries, not knowing whether a commutation would be granted, were loath to trust to an uncertain clemency. Courts quashed indictments or held them invalid, or on the evidence discharged the accused, on the most technical and absurd grounds, thus rendering criminal law the subject of criticism and ridicule. In a recent case (Fralich *v.* People, 65 Barbour, 51) the court said: "When objections like those insisted on by the counsel were available, the prisoner was refused the aid of counsel and the right to examine witnesses in his own defence. The courts were, under the circumstances, compelled to interpose these technicalities in order to save the accused from an unjust conviction. Many of these rules are still permitted to shield offenders from punishment due to their crimes, although the reasons which justified their adoption have long since passed away. It is the application of these absurd technicalities, at this day, that is bringing the administration of criminal law into contempt. We are gradually getting rid of them, and the courts are applying the more wise and safe rule that no error shall avail a prisoner to escape punishment unless it manifestly appears that it may have done him some material injury."

Criminal laws cannot be successfully or efficiently enforced unless sustained by public sentiment. If these laws are popularly regarded as cruel or unjust, juries will disagree or acquit, notwithstanding the strongest and most emphatic charges from the bench. When the criminal might be executed for stealing a sheep as well as for murder, he had not the slightest inducement to refrain from murder if he was detected in the act of carrying off the sheep. Nor was this the worst effect of the criminal law as it existed in England in the last century. Not only the thief caught in the act of theft, and with the instinct of self-preservation brought strongly into action, but persons the least criminally disposed, with ample leisure for reflection, were necessarily affected by the national sentiment (as expressed in the national laws) that it was no greater crime to kill a fellow-Englishman than to pick a pocket.

With the advancement of civilization and the formation of more humane views the abolition of capital punishment, except for murder and a few other atrocious crimes, began to be agitated. Sir Samuel Romilly did much to bring about the desired result. Sir James Mackintosh was a worthy successor in the same work. In 1832, 1833, and 1835 the number of capital crimes was largely reduced. Lord John Russell still further reduced the list of capital offences. Since 1861 murder and treason have been the only offences capitally punishable in England. Corresponding efforts in the cause of humanity followed in the United States. In April, 1841, a select committee of the assembly of the State of New York presented an elaborate report upon the subject, recommending the abolition of capital punishment and substituting imprisonment for life for all crimes then punishable by death, with the proviso that in cases of treason, murder, and arson in the first degree, the governor should not have power to pardon, but might order a new trial in the court in which the conviction was had on the discovery of any new and material evidence in favor of the accused. Where abolition of capital punishment for murder has been tried it has not proved beneficial. Perhaps the State of Maine presents the best illustration of its effects. In that State in 1837 the law was so amended as to make its infliction optional with the governor. He very rarely awarded this extreme penalty, and, as a consequence, murders increased to such an extent that in 1860 Maine had "become notorious for its murders." Nevertheless, from 1834 to 1864, a period of thirty years, not an execution took place. At length a State-prison convict murdered his warden, and for this act, singularly enough, he was hung by Gov. Corry, as if the slaying of a prisoner's natural enemy were a more atrocious crime than the murdering of a wife or a friend. So illogical an enforcement of the capital law of course produced little effect outside of the prisons, and murdering went on till Gov. Chamberlain executed Harris, a negro, for the murder and rape of two old women. His successor, Perham, refused to enforce the law, and capital crime soon proceeded more rapidly than ever, until the legislature passed a law restoring the death-penalty without evasion, and Wagner and Lowell were hung for the murder of five or six victims, men, women, and children. The effect of the new law and its strict enforcement was very striking. During the entire year following its passage only one homicide occurred in Maine, and in that case the murderer committed suicide immediately after the commission of his crime. Yet, in the face of these facts, in 1876 the legislature abolished capital punishment. The result of one year of the law of 1876 was more striking than the effect of the law restoring capital punishment. Barely a year had elapsed from the adoption of the last law before eleven cruel and unnatural murders had been committed in the State.

In Massachusetts prior to 1876 a sentence of death could not be executed until a warrant had been issued by the governor, with the advice of the council, commanding the sheriff to cause execution to be done. The operation of this law was extremely bad. Criminals convicted of murder and sentenced to death had the chance not only of obtaining a pardon, but of profiting by the refusal or neglect of the governor and council. The delay and uncertainty of execution which were incidental to this practice had done much to deprive the sentence of death of its proper influence on the public. In 1876 the legislature, to remedy this evil, passed a law making it the duty of the court, in pronouncing sentence of death, to appoint a time for its execution, and that a warrant should issue under the seal of the court commanding the sheriff to cause execution to be done. In 1860 capital punishment was practically abolished in New York (*Laws 1860*, ch. 410, p. 712), but so great was the sudden increase of murders in that State under that law that in 1862 (*Laws 1862*, ch. 197, p. 368) the legislature was compelled to restore capital punishment in cases of murder in the first degree. The effect of the law of 1862 was an immediate and a marked falling off in the number of murders occurring in that State.

Iowa abolished capital punishment in 1872 (ch. 736, *Laws 1872*), and restored it in 1878 (ch. 165, *Laws 1878*).

Study of these facts cannot fail to show that the abolition of capital punishment is not advisable. Cases of murder constitute probably the only class of crimes against which public sentiment sustains its enforcement. One who wilfully and deliberately destroys human life ought justly to forfeit his own; because, first, such a punishment deters others similarly inclined from committing a like offence; and, secondly, the lives of others are in more danger from him than from one who has never committed the offence.

The statutes of some States practically enable jurors to decline to inflict the death-penalty except in atrocious cases which clearly fall within the definition of murder in the first degree.

By the Revised Statutes of the United States the death-penalty is inflicted for the following crimes: murder; piracy or robbery on the high seas, the accessory before the fact being adjudged equally guilty with the principal; rape, treason. But the court may sentence a person convicted of treason to imprisonment at hard labor for not less than five years and a fine of not less than $10,000. The following outline shows the grades of crime for which capital punishment is prescribed or allowed by the statutes of the several States:

Arkansas.—Murder in the first degree, rape, treason.

California.—Murder in the first degree, at the discretion of the jury, treason.

Colorado.—Murder, if deliberate or premeditated or done in the perpetration, or attempt to perpetrate, some felony. If human life is lost in consequence of arson, the offence is deemed murder. In all cases a jury shall decide the question of premeditation, etc.

Connecticut.—Murder in the first degree, causing the death of another by wilfully placing any obstruction upon any railroad or by loosening, taking up, or removing any part of the superstructure of a railroad, or by wilfully burning any building or vessel. The general assembly may commute the sentence to imprisonment for life.

Delaware.—Arson, burglary in the night-time with intent to commit murder, rape, or arson, whether the attempt be executed or not, murder in the first degree, rape.

Florida.—Murder in the first degree, rape and kindred crimes; the latter may be punished by imprisonment for life. An accessory before or after the fact in murder is punishable with death or a fine not exceeding $1000, or imprisonment not exceeding twelve months, or by fine and imprisonment, in the discretion of the jury.

Georgia.—Arson in a city or village; arson producing death; murder. But if the jury trying the case shall recommend confinement in the penitentiary for life, the presiding judge shall so sentence: if the conviction is founded solely on circumstantial testimony, the presiding judge may sentence to confinement in the penitentiary for life. Rape, unless the prisoner be recommended to mercy by the jury; treason, same as murder.

Illinois.—Treason; for murder, or arson where a human life is lost, the punishment is death or imprisonment not

exceeding fourteen years. The jury shall fix the punishment by their verdict, or upon a plea of guilty the court shall do so.

Indiana.—The following crimes are punishable by death or confinement in the State prison for life, in the discretion of the jury: arson if a life be lost; murder in the first degree; treason.

Iowa.—Murder in the first degree, death or imprisonment for life, at the discretion of the jury, or, if the offender plead guilty, the court must designate which.

Kansas.—Murder in the first degree, treason.

Kentucky.—Arson where human life is lost; murder, death or imprisonment in the penitentiary for life, in the discretion of the jury; treason, death or confinement in the penitentiary, not less than ten nor more than twenty years, in the discretion of the jury.

Louisiana.—Arson; burglary with intent to commit rape, etc.; murder, or poisoning with such intent; rape; survivor of a duel wherein one of the parties was killed; treason.

Maine.—The death-penalty abolished absolutely.

Maryland.—Arson or accessory thereto, death or imprisonment in the penitentiary not less than five nor more than twenty years; burning a public building or conspiring to burn the same, death or imprisonment in the penitentiary for not more than fifteen years; burning or destroying an arsenal or magazine or naval stores or attempting or conspiring to burn the same, death or confinement in the penitentiary for not less than three nor more than ten years; burning an outhouse not parcel of a dwelling-house, etc., death or imprisonment in the penitentiary not less than three nor more than twelve years; carnal abuse of a child, death or imprisonment in the penitentiary not less than eighteen months nor more than twenty-one years; murder, death; treason, death or confinement in the penitentiary not less than six nor more than twenty years.

Massachusetts.—Murder in the first degree, the jury to determine the degree.

Michigan.—Treason. The revision of 1833 punished murder in the first degree with death, but that of 1846 omitted the death-penalty in murder, leaving it only in cases of treason.

Minnesota.—Death-penalty abolished, except that whenever upon the trial of any person, upon an indictment, for murder in the first degree, the jury shall have agreed upon a verdict of guilty of such offence, such jury may also determine that the person so convicted shall be punished by death, and if they so render their verdict the person so convicted shall be punished by death.

Mississippi.—Persons convicted of arson in the first degree, of rape or kindred crimes, or of murder, shall suffer death, unless the jury shall by their verdict fix the punishment at imprisonment in the penitentiary for life. For treason, death.

Missouri.—Murder, first degree, death, the degree to be ascertained by the verdict under instructions of the court; rape, death or penitentiary not less than five years, in the discretion of the jury; treason, death or confinement in the penitentiary not less than ten years.

Nebraska.—Murder in the first degree.

Nevada.—Arson, where a life or lives are lost; murder in first degree.

New Hampshire.—Murder in the first degree, the jury to determine the degree, and on a plea of guilty the court to do so.

New Jersey.—Murder, first degree, aiders, abettors, counsellors, and procurers; treason.

New York.—Murder in the first degree and treason.

North Carolina.—Burglary; the survivor of a duel resulting in the death of one of the parties thereto; wilful murder; rape; an accessory before the fact in any felony punishable with death. The punishment of death in cases of arson only was abolished in 1874.

Ohio.—Murder in the first degree.

Oregon.—Murder in the first degree; treason.

Pennsylvania.—Murder in the first degree.

Rhode Island.—The death-penalty was abolished in this State in 1852, but in 1882 it was enacted that "every person who shall commit murder while under sentence of imprisonment for life shall be hanged by the neck until dead."

South Carolina.—Arson; murder; rape.

Tennessee.—Murder in the first degree, but the court may, on recommendation of the jury, commute the punishment from death to imprisonment for life in the penitentiary.

Texas.—Death occasioned by arson is made murder; murder in the first degree; perjury to a material fact in a capital case if the person accused of the capital felony is convicted and suffers the penalty of death; treason, death or imprisonment for life, in the discretion of the jury.

Vermont.—Arson where life is lost; murder in the first degree, the degree to be determined by the jury on conviction, and on plea of guilty to be determined by the court on examination of the witnesses; treason.

Virginia.—Murder in the first degree; a convict guilty of felony if he kill, wound, or inflict other bodily injury upon one if death ensues; treason.

West Virginia.—Arson in the night-time, death or confinement for life, in the discretion of the jury, but if they find that at the time no person was in the building, not less than five years; a convict guilty of killing an officer or guard or wilfully inflicting an injury from which death ensues; the survivor of a duel resulting in the death of one of the parties thereto; murder in the first degree, except, if the jury convict of murder in the first degree, they may, in their discretion, further find that he be punished by confinement in the penitentiary. If such further finding be not added to their verdict, the accused shall be punished with death; but if added he shall be punished by confinement in the penitentiary during his life, and no pardon shall be granted him unless his *innocence* be established to the satisfaction of the governor. If the accused plead guilty of murder in the first degree, sentence of death or confinement in the penitentiary for life shall be pronounced upon him by the court as may seem right, in the same manner and with like effect as if he had been found guilty by the verdict of a jury. Treason, death or, at the discretion of the jury, by confinement in the penitentiary not less than three nor more than ten years, and by confiscation of his real and personal estate.

Wisconsin.—In this State capital punishment was abolished in 1853.

Capital punishment is required, as it clearly should be, in nearly all the States to be privately inflicted. There is much more terror and more beneficial results in such executions than in those publicly administered. See Cox's *Principles of Punishment*, prefixed to Cox & Saunders's *Criminal Acts;* Beccaria, *Crimes;* Lea, *Superstition and Force;* Coppinger, *Capital Punishment;* Moir, *Capital Punishment;* O'Sullivan, *Capital Punishment;* Pike's *History of Crime;* 133 *North American Review*, 534; Fielding's *Inquiry into the Causes of the Late Increase of Robbers;* Stephens's *History of Criminal Law.*

Modes of Inflicting Capital Punishment.—The Jews frequently stoned their criminals (Lev. xx. 2), but burning alive is also mentioned in the Scriptures as belonging to the earliest times (Gen. xxxviii. 24), and was continued under the Mosaic law in a few instances (Lev. xx. 14). This punishment was frequently inflicted in mediæval and later times upon heretics. The vestal virgins of Rome who violated their vows of chastity were buried alive, and the same punishment is said to have been used by the ancient Britons. Crucifixion was common among the Assyrians, Persians, Egyptians, Carthaginians, Greeks, and Romans. It was abolished in the Roman empire by Constantine, A. D. 330. Garroting by a machine for strangling criminals is the method used in Spain and its dependencies. Beheading, the *decollatio* of the Romans, was introduced into England from Normandy by William the Conqueror in 1076 as a less ignominious mode of putting noble criminals to death. Waltheof, earl of Huntingdon, was the first so executed. The invention of the guillotine is attributed to Dr. Joseph Ignatius Guillotin,

after whom it was named, in 1789. It was made a mode of capital punishment in France in 1792. Pellitier, a highwayman, was first executed, and Dangremont was its first political victim, Aug. 21, 1792. Death by boiling was prescribed by statute 22 Hen. VIII (1531). The act was repealed in 1547. The first execution in England by hanging, drawing, and quartering was that of Maurice, the son of a nobleman, in 1241. Malefactors stood in a cart under the gallows, with the rope round their necks, until the signal was given; the cart was drawn away and the criminal was left hanging. Earl Ferrers, who was hanged May 5, 1760, was the first executed by the drop. Hanging in chains, or gibbeting, was abolished by act of Parliament, July 25, 1834. A law was passed in New York in 1888, enacting that capital punishment should be inflicted by a powerful current of electricity. The first execution took place in 1890, and excited much adverse criticism, though with little warrant in the facts.

CAPTURE. Capture of property in time of war has been greatly limited in recent warfare. Public property, says Field in his *International Code*, § 840, must be respected and protected, so long as not used for military purposes, in the following cases: (1) Lighthouses, storm-signals, interoceanic canals, submarine cables, and all structures and establishments exclusively for the uses of peaceful intercourse. (But a belligerent may destroy or impair these for self-preservation.) (2) Palaces and offices of government, halls of legislation and of justice, churches and temples of religion, hospitals, and other establishments of an exclusively religious or charitable character. (3) Museums, galleries of art, monuments and works of art, libraries, books, and manuscripts; observatories and scientific instruments; depositories of state papers and public archives of historical records, scientific instruments, muniments of property, judicial and legal documents, and other institutions of civil education and culture. This rule is sustained by writers on international law, but it is sometimes violated by belligerents.

The rules as to the capture of private property both on land and sea are conflicting. According to strict law, a belligerent has the right to seize and appropriate or destroy any property of the enemy found in the country on the happening of the war; but in practice this right is now seldom exercised. As to private property in the enemy's territory found by an invading army, it is now considered the rule as well as the practice to abstain from any injury, seizure, or molestation except such as military exigencies require. The most difficult question arises upon the right of capture of private property of the enemy at sea. Up to the latter part of the eighteenth century, neutral ships bearing enemy's goods, and neutral goods borne by enemy's ships, were declared by some nations to be tainted with belligerency, and liable to seizure and confiscation. This doctrine, so far as relating to neutral ships, was abandoned by the nations parties to the armed neutrality of 1780. By the Treaty of Paris of 1856 it was declared that "a neutral flag covers enemy's goods, with the exception of contraband of war; and neutral goods, with the exception of contraband of war, are not liable to capture under an enemy's flag." The original parties to the Declaration of Paris were Great Britain, Austria, France, Prussia, Russia, Sardinia, and Turkey; and it has since been adopted by Holland, Belgium, Portugal, Denmark, the Roman States (Italy), and many others, including most of the South American Governments. The United States Government has recognized the doctrine in treaties with various countries. It has been proposed further to limit maritime capture so as to exclude all private property, whether of the enemy or a neutral, except contraband of war. This doctrine is supported by those holding advanced views of international law and by nations possessing a large commerce without adequate naval protection. The great naval powers, like Great Britain, are decidedly opposed to the adoption of a rule which would deprive them of many of the benefits of their offensive maritime strength. It is not probable, therefore, that the rule of absolute exemption from seizure or violation of private property of the enemy at sea will soon be admitted into the law of nations. See CONTRABAND OF WAR. (A. P. S.)

CAPUCHINS (*Ordo Minorum Capuccinorum*) IN AMERICA. The Capuchins are a branch of the Franciscan order, distinguished by great asceticism, and in dress by the hood (*cappuccio, capouche*), whence their popular name. Introduced into France in 1574, and befriended by Cardinal Richelieu, they were chosen as chaplains to the French military posts in North America. They labored in Acadia and the adjacent British possessions, in Brazil, and in the West Indies. In 1642 they had permanent missionary stations on the Kennebec and Penobscot rivers, Me. From 1722, Mississippi, and Louisiana up to its annexation to the United States, were under the almost exclusive religious guidance of the Capuchins. The French Revolution nearly destroyed the order. At present the Capuchins have a seminary at Calvary, Wis., and houses at Calvary, Milwaukee, Pittsburg, Herman, Pa., Utica, Syracuse, N. Y. (2 houses), and Fort Lee, N. J. (J. V. O'C.)

See Vol. V. p. 71 Am. ed. (p. 79 Edin. ed.).

CAPYBARA, a South American quadruped of the family *Hydrochœridæ* and order *Rodentia;* the *Hydrochœrus capybara*, noted as by far the largest existing representative of the order to which it belongs, being some 4 feet long. It has a somewhat hog-like aspect, with a massive body, moderately long limbs, large head, blunt muzzle, long, coarse, scanty hair, small eyes and ears, uncleft muffle, webbed feet, and no tail. The color is dull reddish-brown above, brownish-yellow below. The toes of the fore feet are four, of the hind three, terminating in large hoof-like nails. The skull is massive, with deep zygomatic arches and long paroccipital processes; the palate extends back of the teeth, and the incisive foramina are small; the mandible has a small masseteric ridge; the dental formula is the same as in *Caviidæ*, and indeed nearly all the Hystricine series of rodents ($p.\ m.\ \frac{1-1}{1-1}$): the upper incisors are sulcate; the molars are remarkably complicated by foldings of the enamel, which divide them into more or fewer transverse lobes cemented together, the back upper molar indeed having twelve narrow plates. The extreme elongation of the back upper molar, and the co-ordinated extension backward of the alveolar portion of the jaw, which is so great that the maxillary bone articulates with the squamosal near the glenoid fossa, are the principal characters of the family *Hydrochœridæ* as distinguished from *Caviidæ*. In habits the capybara is aquatic, frequenting the lakes and rivers of the continent from Guiana to La Plata, and westward into portions of Peru and Bolivia. (See CAVY.) (E. C.)

See Vol. V. p. 72 Am. ed. (p. 80 Edin. ed.).

CARACARA, an American rapacious bird of the family *Falconidæ*, sub-family *Polyborinæ;* the *Polyborus caracara* or *P. tharus* of naturalists. In certain

technical characters of the skull and scapular arch this genus is allied closely to the typical falcons; the external characters are more those of the buzzard-hawks, while in its indolent, slovenly, and carrion-feeding habits the caracara resembles the vultures. The beak is long, high, compressed, little hooked, not toothed, with the commissure straight to near the end; the nostrils are peculiar in shape and position, being obliquely linear and opening high in the edge of the cere; the head is extensively denuded and bristly; the shank is long and almost naked. The bird is nearly or about 2 feet long, with the wing about 16 inches, the tail about 10; the color is blackish, more or less extensively and regularly barred with yellowish-white; the tail whitish, with a broad black terminal zone and numerous narrow black bars; the bill and feet yellowish. The caracara inhabits the entire southern border of the United States, and thence extends into Mexico and tropical America: in places where food is abundant, as about slaughter-houses, it sometimes congregates in large numbers. Unlike most hawks, it walks with ease on the ground. The United States bird is generally rated as a variety (*auduboni*) of the South American *P. tharus*. A second and quite distinct species of the genus (*P. lutosus*) inhabits the island of Guadalupe, off the west coast of Mexico. (E. C.)

CARBONDALE, a city of Jackson co., Ill., is on the Illinois Central Railroad, 56 miles N. of Cairo and 125 miles S. E. of St. Louis, on the Illinois Central Railroad, the St. Louis Coal Railroad, and the Grand Tower and Carbondale Railroad. It contains two hotels, two banks, two weekly newspapers, six churches, six schools, and is the seat of Southern Illinois Normal University, founded in 1869. It has three flour-mills, woollen-factory, two machine-shops, and minor industries. It has five parks; its property is valued at $2,500,000, the yearly expenses are $7500, and the public debt is $60,000. It was settled in 1856, and incorporated in 1868 as a city, and no liquor is sold in it. Population, 2213.

CARCANO, GIULIO, an Italian poet and novelist, was born at Milan, Aug. 7, 1812, of a patrician family. After preliminary studies at Turin he studied law at the University of Pavia. Before completing his studies he published in 1835 a romance, *Ida della Torre*. In 1839 this was followed by *Angelo Maria*, a touching story of a village-girl, which soon passed through ten editions and was translated into French and German. In the revolution of March, 1848, he took an active part, being secretary of the provisional Government of Lombardy and being sent to Paris on a diplomatic mission. When banished by the Austrian Government in 1849, he retired to Switzerland, and afterwards spent two years in Piedmont. After the war of Italian independence in 1859 he was appointed by the national Government inspector of schools in the province of Milan. He afterwards became a member of the Royal Lombard Institute of Sciences and of the Superior Council of Public Instruction. In 1876 he became a senator of the kingdom. He had continued his literary activity, producing a number of domestic and popular novels, of which the best known is *Damiano*. He has also published three tragedies, two volumes of lyric poems, and a series of biographies of distinguished men. A select edition of his works was published at Florence in four volumes (1861–70). His last romance, which appeared in 1876, *Gabrei e Camilla*, is founded on an episode of the war of independence. In 1843 he began the translation into Italian of Shakespeare's plays, which he has finally accomplished in 1882 in twelve volumes. In it he has observed the most exact fidelity to the original, while the style has been universally praised. His poetry, as well as his other works, is marked by a religious spirit, and he is regarded as a representative of the school of Manzoni.

CARDINAL, or CARDINAL GROSBEAK, a conirostral oscine passerine bird of the family *Fringillidæ*, the *Cardinalis virginianus* of authors, inhabiting more southerly portions of the United States, and noted alike for the beauty of its plumage and the richness of its song. It is also known as the Virginia red-bird and Virginia nightingale—the latter a most misleading term, as there is no bird of the United States which in the least resembles the European nightingale. The cardinal is 8 or 9 inches long; the wing, about 3¾; the tail, 4; the head is adorned with an elegant pointed crest; in the male the general plumage is a bright red, ranging from vermilion to a more rosy tint, obscured with gray on the the back; the face with a black mask; the bill red: the female is brownish, paler and somewhat ochraceous below, but crested like the male, and with more or less red on the crest, wings, tail, and under parts. This bird, of striking appearance and brilliant vocal powers, abounds in the Southern States, becoming less numerous in the Middle, and rarely reaching New England. A variety (*C. v. igneus*) occurs along our Mexican border and thence southward; it is very similar, but the black mask is narrowed or broken on the forehead. Some other species inhabit the warmer parts of America. The Texas or parrot-billed cardinal (*Pyrrholoxia sinuata*) belongs to a different genus, characterized by the very short, stout, tumid bill, with very strongly convex culmen and sinuous commissure; in form and size it resembles the ordinary cardinal, but the bill is whitish: there is no black frontlet; the plumage is ashy-brown, paler below, with crimson or carmine-red in definite areas on the crest, throat, breast, mid-line of belly, and feathers of the wings and tail. All these birds agree closely in their habits, haunting shrubbery, chapparal, or other thick undergrowth, from the heart of which issue their rich rolling notes, while the performers are hid from the view. The nest is built in the thickest bushes, for the most part of intertwined rootlets, bark-strips, and similar materials; the eggs are about four in number, rather elliptical than oval, and very heavily colored all over with brown, gray, and other neutral tints. The birds feed chiefly upon seeds and fruits, like other *Fringillidæ*, and are not migratory. (E. C.)

CAREY, HENRY CHARLES (1793–1879), the greatest of American economists, was born in Philadelphia, Dec. 15, 1793, being the oldest son of MATHEW CAREY (*vide infra*). His father took especial pains with his education, even training him in the observation and study of economic facts as they walked the streets together. He early developed practical talent; in his ninth year he attended the first trade-sales in New York, where he was called "the little bookseller," and in his twelfth he took charge of the Baltimore branch of his father's firm. In 1812 he served in the militia raised for the defence of Philadelphia. In 1814 he became the second partner in his father's firm, and continued in the business of publishing and bookselling until 1836. In 1828 his firm became Washington Irving's publishers, to that author's express satisfaction, as indeed they were known as the most spirited and energetic house in the trade.

In 1833, Mr. Carey bought a house in Burlington, N. J., where he resided until 1855. On his retirement

from the book-business in 1836 he invested a part of his fortune in a paper-mill, in which he sustained heavy losses during the depressing years 1837–40. During his residence in New Jersey he felt, as did the people generally, the oppressions growing out of the monopoly granted to the Camden and Amboy Railroad Co. He was not the man to submit tamely to a corporation which levied toll at its pleasure upon the intercourse between the two chief cities of the country, and which showed the grossest favoritism to the business interests of its directors and stockholders. He began a war of pamphlets, petitions, and newspaper articles which forced the company to a public defence of the manner in which its franchises were exercised, and then to a reform of the worst abuses of its exceptional powers. Mr. Carey thus began that struggle to secure the governmental regulation of the great railroad corporations which still is in progress.

In 1855, Mr. Carey returned to Philadelphia, where he lived as a retired gentleman until his death. His spacious house at Tenth and Walnut Streets, where the "Carey Collection" of pictures and his library of statistical and economic literature were arranged, was the scene of weekly reunions in which the visitor to Philadelphia met with some of the pleasantest and the most characteristic society of the city. Especially during the hospitalities of the Centennial year these gatherings were thronged by distinguished visitors, who cherished his friendship by constant correspondence up to the time of his death. In social intercourse he was brusque but delightful, full of anecdote and reminiscence and of reckless and humorous speeches, exhibiting a raciness and intense individuality, while his inexhaustible kindliness won him the personal regard of all who really knew him. His family circle, in which he was the most tender of husbands and fathers, was broken in 1847 by the death of his wife, the sister of the artist C. R. Leslie.

In 1857, and again in 1859, he visited Europe. On the former visit he warned Mr. George Peabody of the impending panic in America, and Mr. Dallas in Paris of the approach of the Secession movement and the danger to the Union.

Mr. Carey had been a member of the Republican party from its inception, as he recognized the right and duty to oppose constitutional barriers to the spread of slavery. Into the struggle for the Union he entered with his whole heart, animating his fellow-citizens by voice, pen, and personal example to the maintenance of national unity. He was the trusted adviser of both Mr. Lincoln and Mr. Chase, the latter submitting to him the plan for a national banking system, and finding his predictions as to the weak points of the first draft fully confirmed by experience. In politics he continued to take a deep interest to the last. He was a member of the constitutional convention of 1872 which prepared the new constitution for Pennsylvania, and gave valuable aid in shaping its provisions. He opposed the policy of a rapid and wholesale contraction of the national paper currency inaugurated in 1867 by Secretary McCulloch, believing that it would inflict needless and widespread suffering upon classes which had incurred debts during the period of expansion, and would result in the currency of wild monetary plans and theories, especially among the owners of mortgaged farms in the West. When his fears were realized in the rise of the Greenback party, he equally opposed their plan to cancel all bank paper and to substitute Treasury notes, as he believed that the country banks could not exist without their circulation, and that they were of prime importance as local centres of business impulse and facility. He favored the remonetization of silver, and resisted Mr. Sherman's plan for the resumption of specie payments, believing that there was no necessity to make our currency dependent upon our variable and uncertain supply of gold.

For years before his death Mr. Carey had been decaying visibly. He felt keenly the privations and restrictions which accompany old age, although his immediate family and his friends lost no opportunity to lighten the burden. He contracted the illness which resulted fatally in attending a meeting of the Hibernian Society, founded by his father in 1798, and died Oct. 13, 1879. He bequeathed his valuable library to the University of Pennsylvania.

Books and Doctrines.—Mr. Carey began his public career as an economist by an *Essay on the Rate of Wages* (1835), which was mainly a reply to Mr. N. W. Senior's lectures on the same subject. In this he refuted what has been called "the seesaw theory" of wages and profits, then so current among orthodox economists. In 1836 he printed, but did not publish, *The Harmony of Nature, as Exhibited in the Laws which Regulate the Increase of the Population and of the Means of Subsistence, and in the Identity of the Interest of the Sovereign and the Subject, the Landlord and the Tenant, the Capitalist and the Workman, the Planter and the Slave.* A very few copies still exist. In 1837–40 appeared his *Principles of Political Economy*, in three volumes, which was translated into Italian in 1853 and into Swedish in 1853–56. In 1838 appeared *The Credit System in France, Great Britain, and the United States*, which is an ampler treatment of a subject discussed more briefly in the *Principles*. In 1840 he concluded this first group of his writings with a pamphlet on the *Currency*. In all these works he elaborates the principle that there is, in Bishop Butler's phrase, a "constitution and course of nature" in economical matters as elsewhere—that it is a system of harmony and beneficence, expressing to us the benevolence of its divine Author, and exactly adapted to the needs of our human nature. The business of the economist is to learn the laws of the economic order; that of the statesman is simply to remove all obstacles to the free play of those laws. From this he draws the inference that governmental interference in the economic sphere is radically mischievous; that unrestricted commerce between the nations must conduce to the benefit of each and all; that the least restricted banking system—he contrasts Rhode Island with Pennsylvania—is the safest; and that paternal government defeats its own ends. His method throughout is the reverse of that of the orthodox economists; like his father, he always was hungry for facts, and believed that these, and not assumptions, furnished the safe basis for sociological investigation.

With this point in Mr. Carey's teaching some of his European disciples—M. Bastiat, M. Benjamin Rampal, Herr Schulze-Delitzsch, and Prof. Banfield—stop. It was from the *Principles* that M. Bastiat derived not only the doctrines, but most of the arguments and many illustrations, of his *Harmonies économiques* (1850), without acknowledgment of any sort. But Mr. Carey was driven by the hard logic of facts to a further development of his system. When the *Principles* appeared the country was going through the severe depression which economists like his father ascribed to the abandonment of the protective system in 1835.

The people at large were satisfied that this view of causes and effects was right, and in 1840 they elected a Whig President pledged to restore the protective tariff. From the tariff of 1842 Mr. Carey expected nothing but a prolongation of the disasters under which he with others had suffered in the preceding years. But he was fairly staggered when he saw the Government credit restored, labor finding employment, capital expanding its ventures in legitimate business, and all those good results achieved which he should have pronounced impossible. He was silenced, and until 1848 he maintained this silence, studying the problem in the new lights of national experience. By 1847 he reached the conclusion that he had under-estimated the number and the force of the hindrances which may arise to the beneficent operation of the laws of economic order. He parted with none of the positive results of his earlier works, but he came to see that in some circumstances the co-ordinating power of Government is needed to secure a harmonious development of national industry by removing the hindrances which more developed communities may find it to their advantage to offer to the industrial growth of the newer and the less developed. In 1848 appeared *The Past, the Present, and the Future*, (Swedish translation by S. J. Callerholm, Stockholm, 1849–51), devoted mainly to a refutation of the assumptions involved in Mr. Ricardo's theory of rent; in 1851, *The Harmony of Interests, Manufacturing and Commercial*, collected from the pages of *The Plow, the Loom, and the Anvil*, to which he frequently contributed. These were followed by *The Slave-Trade, Domestic and Foreign* (1853); *Letters on International Copyright* (1853); *Letters to the President on the Foreign and Domestic Policy of the Union* (1858); and his *System of Social Science*, in three volumes (1858–59; translated into German by Carl Adler, 3 vols., München, 1863–64; 2d ed. 1866; also, Berlin, 1866, and Wien, 1870; abridged by Miss Kate McKean, Phila., 186–, and translated from this abridgment into German and Japanese). This is his *opus magnum*, and may be said to complete the writings of his constructive period, those that followed being occupied with reiteration and defence.

From first to last, Mr. Carey elaborates the principle of his earliest works: that we have to deal with an economic order which exists apart from all our notions and desires; that its laws are always beneficent, but may be thwarted by human wilfulness or stupidity; and that the business of the economist is not to devise but to discover these laws, and that of the statesman not to override but to comply with them. He thus occupies a middle position between optimists like Godwin and pessimists like Malthus and Ricardo, asserting the goodliness of the social order, but admitting the possibility of its defeat. Against Malthus he asserts that the growth of population is self-regulating in every well-governed community, and that the pressure of population on subsistence characterizes only the earlier stages of society; in this anticipating Herbert Spencer. Against Ricardo he asserts that the whole history of mankind proves a constant progress, not from richer to poorer soils, but the reverse; that the "law of diminished return from the soil" with the increase of labor expended is the direct reverse of the truth; and that the value of land is derived not from the natural and inalienable properties of the soil, but from labor expended, thus anticipating and disproving the agrarian socialism which bases itself upon orthodox doctrines as to land and land-ownership. Against Hume and Torrens he showed that money plays an active part in the industrial economy; that it is the instrument of association as well as of exchange; that its accumulation at various industrial centres is determined not by demand in the sense of simple need, but by that local development of industrial faculty which makes money more useful at the points to which it tends than at those from which it flows; and that, in the absence of other checks, it will gather into a few great centres of population where its previous accumulation has enabled the most perfect organization of labor. As against the English school generally, he showed that the doctrine of a wage-fund (accepted in his *Principles*) is a delusion resting on no facts; that there is no natural and necessary rate of wages, while there are necessary upper and lower limits to the rise and fall of wages; that the employer finds his interests promoted by high wages more than by low; and that the constant decline in the value of all the accumulations of past labor results in a tendency to equality of condition between labor and capital, the former growing constantly in power to command the services of the latter. For the *price* of a thing is determined by the cost not of its production, but of its reproduction, and with every improvement in method or advance in art, and often by the mere accumulation of products, the cost of reproduction is diminished. Things fall in value, man rises. Closely related to this definition of price are his definitions of *value* and of *wealth*. Recognizing with Ricardo the antithetic relation of the two conceptions, he overcame the perennial difficulty experienced by the English school in fixing the sense of either term. Value he defined as the measure of nature's resistance to our obtaining the objects of our desires; wealth, as the measure of man's victory over nature's resistance. Finally, as against the whole English school and its American representatives, he showed that unrestricted commercial intercourse between nations of different rank in industrial development often results in serious injury to the less advanced by preventing the accumulation of capital, checking the development of a varied industry, destroying the power of industrial associations, and draining the country of its money.

Mr. Carey's vigorous advocacy of these positions soon won for him a foremost place as the representative of the Protectionist party. From 1848 till 1857 he was a constant contributor to the columns of *The Tribune;* but in 1857 Mr. Greeley for a time abandoned the struggle on the passage of the tariff law which still further reduced the duties of the horizontal tariff of 1847. "The whole world has gone over to Free Trade," he said. "If you will wait a little," replied Mr. Carey, "you will see it come back to Protection." Before either gentleman died the greatest of English newspapers spoke of "the wave of Protectionist sentiment which seemed to be sweeping round the world." To the inception and the force of that wave Mr. Carey contributed more than any other man. Before he died he was speaking to the world in eight European and one Asiatic language; he was in correspondence with statesmen, economists, and statists of nearly every European country; and his authority was alleged in the debates of American congresses and European parliaments. (R. E. T.)

CAREY, MATHEW (1760–1839), an American publisher, economist, and philanthropist, was born in Dublin, Jan. 28, 1760, and was the son of a large baker and contractor for the army. He gave no promise of mental force in his youth, and received only a limited education. At the age of fifteen he was apprenticed to a prin-

ter and bookseller, at his own desire and in spite of his father's dislike of that calling, and became a voracious reader of such books as came in his way. In 1779 he wrote and announced for publication a pamphlet on *The Urgent Necessity of an Immediate Repeal of the Whole Penal Code against the Roman Catholics.* The title and some daring mottoes on the proposed title-page excited so much indignation that the Roman Catholic committee was alarmed, and offered a reward for the discovery of the author. Young Carey's father procured its suppression as the only means to avoid a prosecution, and sent his son to Paris with letters of introduction to Dr. Franklin, who gave him employment in his printing-office at Passy. After a year he returned to Dublin and got work on *The Freeman's Journal*, and in 1783 started *The Volunteer's Journal* to promote the agitation then going forward for the parliamentary independence of Ireland. He was arrested for libelling the Irish Parliament, and committed to Newgate until the end of the session. Having exhausted his funds, he emigrated in the fall of 1784 to America, landing at Philadelphia. La Fayette, who was then on a visit to this country, interested himself in the young Irish patriot, sent for him to his lodgings, and, besides recommending him to Americans of influence, gave him four hundred dollars to start a newspaper. In January, 1785, Mr. Carey began to publish *The Pennsylvania Herald*, and made a beginning of the practice of reporting the speeches at public meetings and in legislative bodies. A political dispute led to a duel with Col. E. Oswald, in which Mr. Carey was wounded, and was confined to his room for over a year. In October, 1786, he aided in starting *The Columbian Magazine*, both as a partner in publishing and by his contributions, but he soon withdrew, and in January, 1787, he began to publish *The American Museum*, which appeared for six years, and was much superior to any other American magazine. The circulation was fairly large, but the subscription so low that he was constantly embarrassed for money. It was highly commended by Gen. Washington, Dr. Rush, Bishop White, and others. On relinquishing it he began bookselling and publishing on a small scale, and at this he continued until his retirement from business in 1825. In 1792 he married Miss B. Flahavan, who proved a most estimable and useful wife. Of their nine children, six grew to maturity. In 1793 the yellow fever broke out in the city, and raged with fearful violence. Mr. Carey was one of the committee of citizens for the relief of the sick and the care of orphans, and afterward published an account of it which ran through four editions. About the same time he called the meeting which founded the Hibernian Society, to care for the Irish emigrants coming to Philadelphia, and he served as its secretary for many years. In 1796 he helped to establish the Sunday-school Society, under the presidency of Bishop White. The same year he became the object of attack in William Cobbett's *Peter Porcupine's Journal*, and retorted first in *A Plumb Pudding for Peter Porcupine*, and then by *The Porcupiniad, a Hudibrastic Poem.* In 1801 he formed the plan of book-fairs, after a model suggested by the Leipsic *Messe*, and the next year it was adopted at a meeting of booksellers in New York. His own business as a publisher was one of the most extensive and successful in America, and many of the most popular and of the most costly books of this period bear his imprint. In 1806 he began his career as an economist by publishing strictures on the system of taxation pursued in Philadelphia, by which real estate, and especially ground-rents, were taxed to the exemption of personal property. In 1810, although a Democrat, he supported the proposal to renew the charter of the First United States Bank, taking three months from his business to study the subject and illustrate it by his pen; but he received no encouragement from the directors, who even, through a false sense of dignity and delicacy, refused him any information he might need. Besides letters in *The Democratic Press*, he published *Desultory Reflections* and *Nine Letters to Dr. Adam Seybert*, and visited Washington to urge the matter, but without avail. The party in power had little faith in banks of any kind, and much fear of a national institution of this kind. To soften the party asperities which divided Democrats and Federalists, he wrote and published in 1814 his celebrated *Olive Branch*, which passed through ten editions in less than four years, being reprinted in Boston, Middlebury, Vt., and Winchester, Va., with his permission. In March, 1819, appeared his *Vindiciæ Hibernicæ*, designed to vindicate the Irish Catholics from the charges involved in the reports of the rebellion and alleged massacre of 1641—charges then recently reproduced in Godwin's novel, *Mandeville.* Immediately after its appearance he became deeply interested in the causes of the general depression of industry which followed the War of 1812–15, and took part in the organization of the "Philadelphia Society for the Promotion of National Industry." He wrote for the society all but two of the brief "addresses," which, after a wide circulation in tract-form and in the columns of Northern newspapers, were collected into a volume, ran through two editions, and were reprinted in Boston. The other two were by Dr. Samuel Jackson. Another pamphlet from his pen the society refused to adopt as couched in too severe language, so he withdrew in 1820 from its membership, but continued to agitate the matter for thirteen years, in which time he wrote and published more than 2000 pages, making nearly 60 separate publications. The most important of these was *The New Olive Branch, or An Attempt to Establish an Identity of Interest between Agriculture, Manufactures, and Commerce* (1820), of which parts ii., iii., and iv. appeared in 1831–32, and the twelve series of tracts called *Hamilton* (1822–26). The value of his services was acknowledged by Clay, Madison, Adams, De Witt Clinton, and the other Protectionist leaders of that time. Mr. Carey had no selfish interest to serve by a course which cost him money, time, and anxiety without making him any adequate return. He was actuated simply by a passionate patriotism and a conviction that the Free-Trade policy would involve the industrial ruin of his adopted country.

The miseries of the poor and of the laboring classes in Philadelphia moved him to write his *Essays on the Public Charities of Philadelphia* (1828), which vindicate Christian charity from the crude objections of the Malthusians, and have a permanent interest from their glimpses into the social condition of the city. He also supported by pen and purse the policy of the Colonization Society, and advocated a gradual emancipation of the Southern slaves after the fashion adopted in the Northern States. The struggling people of Greece found in him a zealous friend. In 1830 he collected as *Miscellaneous Essays* his accounts of the yellow fever and of the city charities and many shorter papers. His lesser publications are counted by scores. He was an indefatigable pamphleteer, but always for some public end. Without much claim to grace of style, he generally managed to secure the public attention by his frank,

dogmatic, incisive presentation of his facts and theories.

He died Sept. 16, 1839, after a brief illness, and was buried in St. Mary's churchyard according to the rites of the Catholic Church, of which he was an intelligent and devout member.

Mr. Carey was a man of less than the average size, and was lame from his youth. But he had a quick eye, a ready tongue, and unlimited social courage, so that he never failed to make an impression on any company. He was a man of pure life, unimpeached integrity, and fervent patriotism; and Philadelphia has had no more public-spirited citizen. (R. E. T.)

CARINATÆ (*i. e.*, *Aves carinatæ*, n. pl.; Lat. *carina*, a keel or keeled vessel), one of the prime divisions of the class of birds, including all existing birds excepting the ostrich and its allies; named from the fact that the sternum develops a keel, which is wanting in the struthious birds, or *Ratitæ* (Lat. *ratis*, a raft). The *Carinatæ* have no teeth; more or fewer of the vertebræ are *heterocœlous*, having saddle-shaped ends of their centrums, and some of the coccygeal ones are fused together into a share-bone or pygostyle, from which the tail-feathers radiate; there is extensive postacetabular ankylosis of pelvic bones; the metacarpal bones are ankylosed together, and the wings are, with rare exceptions, fitted for flight. The carination of the sternum is coordinated with a particular condition of the scapular arch, the scapula and coracoid bones meeting at less than a right angle (with hardly an exception), and clavicles being usually present and complete. In *Ratitæ* the opposite condition of the scapular arch occurs. In all *Carinatæ* also, excepting the tinamous (*Dromæognathæ*), the arrangement of the palatal and pterygoid bones differs notably from the construction of the same parts in *Ratitæ*. Some of the oldest known fossil birds, as *Archæopteryx* and *Ichthyornis*, had keeled breast-bones, but such had teeth, amphicœlous vertebræ, etc., being therefore excluded from *Carinatæ* as here defined. In one of the *Carinatæ*, the ground-parrot (*Stringops habroptilus*), the sternal keel is rudimentary. (See RATITÆ.) (E. C.)

CARLÉN, EMILIE (FLYGARE), a famous Swedish novelist, was born Aug. 8, 1807, in Strömstad, daughter of a merchant, Rutger Schmidt. At the age of twenty she married a physician, A. Flygare, after whose death, in 1833, she spent some years without any permanent residence. During this time she became engaged to a lawyer, R. Dalin, a man of great talent and broad views. He died before they were married, but still, it is claimed, her intellectual development was greatly influenced by him. In 1839 she became domiciled in Stockholm, where she in 1841 married John Gabriel Carlén. Mrs. Carlén was thirty years old when she published anonymously her first romance, *Valdemar Klein* (1838), which evinced literary talent of great power and was received with universal approbation. It was followed by a long series of novels, appearing in rapid succession: *The Representative* (1839); *Gustaf Lindorm* (1839); *The Professor* (1840); *The Foster Brothers* (1840); *The Dedication of Hammarby Church* (1841); *The Rose of Thistleton* (1842); *Chamberlain Lassman* (1842); *The Entail* (1844); *The Fiddler of St. John's Rock* (1846); *The Maiden Castle* (1848); *A Capricious Woman* (1849); *The Tutor* (1851). There was now an interruption of seven years, occasioned by the death of her son, C. W. E. Flygare (1829–1852), who by his translation of some of his mother's sketches into German and by original works had shown decided talent as a scholar and novelist. In 1858, Mrs. Carlén again took up her pen, and wrote, though with less rapidity than before, *The Trading-house* (1860); *Stockholm behind the Scenes* (1864); *The Magic Lantern* (1865); and, finally, *Recollections of Swedish Literary Life, 1840–60* (1878), with which she seems to have closed her industrious career. The complete Swedish edition of her novels is published in 31 volumes. Many of them have been translated into Danish, French, German, and English.

No other Swedish writer has been read so extensively as Mrs. Carlén. Her stories are bright and sparkling, giving evidence also of unusual powers of observation. In recognition of her great services to her country's literature, the Swedish Academy gave her in 1862 its great gold medal. Her literary income has also been large, when we take into account the comparatively small population of her country. Nor has she been ungrateful for the appreciation she has received. She has founded a fund for the benefit of poor fishermen and fishermen's widows, called the "Rutger Schmidt Fund," in honor of her father; a fund for the aid of talented students at the Upsala University, in commemoration of her deceased son; and, in honor of her husband, a fund for poor teachers. Though lacking in deep psychological insight, she has still, by her graphic pictures of every-day life, attained a place among the great romance-writers of this generation.

CARLÉN, JOHAN GABRIEL (1814–1875), a Swedish author, second husband of the preceding, was born in Westgötland, Sweden, July 9, 1814. He studied law, but soon gave up his law practice and devoted himself to literature. Besides some manuals for lawyers, he wrote *Poems* (1838) and *Romances of Swedish Life* (1846). He is also known as the editor of two encyclopædias—*Svenska Familjeboken* (1850–52) and *Läswing vid lusligahärden* (1860). He edited the poetical works of A. M. Lenngren (1857), Bellmann (1856–61), and J. A. Wadman (1869). His *Collected Poems* appeared in 1870. He died in Stockholm, July 6, 1875.

CARLINVILLE, the county-seat of Macoupin co., Ill., is on the Chicago and Alton Railroad, 59 miles N. E. of St. Louis; two other railroads are projected to cross at this point. It is lighted with gas, has two banks, four hotels, two weekly newspapers, eight churches, and graded schools. It has a splendid court-house, erected in 1870 at an expense of $1,500,000. The industries of the town comprise a large foundry and machine-shops, four flour-mills, a woollen-mill, three coal-shafts, and it has over 200 business-firms. Blackburn University, a Presbyterian institution with a theological department, is situated here. The university was founded in 1852 with a liberal endowment, and has an attendance of more than 200 students. Population of Carlinville, 3117.

CARLSON, FREDERIK FERDINAND, a Swedish historian, was born in Upland, June 13, 1811. He received his education in the University of Upsala, where he graduated in 1833, and travelled through Denmark, Germany, Italy, and France, making a long stay in Berlin and in Rome. On his return in 1836 he was made professor of history at Upsala, but was called the next year to Stockholm as tutor to the prince royal. In 1847 he resumed his professorship at the university, which he represented in the Diet for several years. In 1863 he resigned this position to become minister of public instruction and worship at Stockholm. He resigned office in 1870. On May 11, 1875, he was recalled, and retained the post until November, 1878. He is a member of the Academy of Sweden and of the

French Academy of Sciences. His principal work is his *History of Sweden*, which appeared both in German and in Swedish (*Sveriges Historia under Konungarne af Pfalziska huset*, Stockholm, 1855–81, 6 vols.). This work, remarkable for the knowledge displayed and the skill in its management, serves as a sequel to the work of Geijer in Heeren and Ukert's *History of the European States*. Carlson has published other works on the history of his country.

CARLYLE, the county-seat of Clinton co., Ill., is on the Kaskaskia River, 47 miles E. of St. Louis, and on the Ohio and Mississippi Railroad. The river is here crossed by a suspension bridge 300 feet long and a railroad bridge 500 feet long. Carlyle has a fine court-house, town-hall, five hotels, two banks, four weekly newspapers, seven churches, a public school and a parochial school. It has four furniture-factories, four wagon-factories, three flour-mills, a grain-elevator, and a saw-mill. Coal is found here, but is not much worked as yet. The town was settled in 1807, and incorporated in 1837. Its property is valued at $1,500,000, and its public debt is $1000. The people are chiefly of American birth, though there are many Germans. Population, 2017.

CARLYLE, THOMAS (1795–1881), the most prominent English writer of the nineteenth century, was born on the 4th of Dec., 1795, at Ecclefechan, a small village in Annandale, Dumfriesshire, Scotland. With this place is also identified in several ways the name of Robert Burns, who died a few months after the birth of Carlyle. Thomas was the first child of the second marriage of James Carlyle, stone-mason and small farmer, known as a man of integrity and much sternness of character—"of all the men I have ever known, quite the remarkablest," writes his son of him. The father of James was remembered as somewhat shiftless and irritable, but in the main honest. James's first wife was a remote cousin; his second, Margaret Aitkin, for whom Carlyle showed strong affection. He speaks of her as "beautiful in all that makes the excellence of woman," and as having "a good deal of wit and originality of mind." Little is known of the Carlyle family back of the second generation, except that it was probably of Cumberland origin, though Carlyle himself, who seems to have had some belief in a pedigree of his own humble branch, traced back ten generations to a Sir John Carlyle, first lord of Torthorwald. From the Rev. John Johnstone, minister of Ecclefechan church, whose son was Carlyle's first teacher, and from his own father, Carlyle, who was a quiet child, received his earliest serious impressions. In 1805 he was sent to school at Annan, where he laid a good foundation in mathematics. It was his father's wish that his son might continue his education to fit for the ministry, and accordingly, in 1809, when nearly fourteen, he set out on foot, with a companion, for Edinburgh University. He complained of the general neglect shown him there as a scholar, one professor at parting from him, his ablest pupil, manifesting "not the slightest sign that I was a person whom he could have distinguished in any crowd." Sir John Leslie, then professor of mathematics, appears to have been his favorite. He soon discovered for himself, what he announced long afterwards, that "the true university of our days is a collection of books." He completed his course in 1814, and while in doubt in regard to becoming a minister began to teach mathematics at Annan until 1816, when he was offered the position of master of the Burgh school at Kirkcaldy, where he found a firm friend in Edward Irving, then teaching there—"the freest, brotherliest, bravest human soul mine ever came in contact with," he wrote after Irving's death. In two years Carlyle had definitely given up the ministry and grown tired of "school-mastering;" so in 1818 he, with Irving, went back to Edinburgh, where he attended law-lectures and secured a few private pupils. He was at that time attacked with the dyspepsia, which lasted all his life. Sir David (then Dr.) Brewster was editing the *Edinburgh Encyclopædia*, and employed Carlyle, who contributed articles on Montaigne, Montesquieu, Nelson, and other topics, sixteen in all, even venturing on so remote a subject as Newfoundland. In 1820 law was abandoned, and his studies in German literature were begun, for he was already meeting refusals for proffered translations of Schiller. He became in 1822 the tutor, at a salary of £200 a year, to Charles Buller, then a boy of fifteen, and to his brothers. By that time he had finished a translation, which Brewster edited, of Legendre's *Elements of Geometry and Trigonometry*, to which he prefixed a paper on Proportion, valued highly by him, although it was begun and finished in a forenoon. The first result of his German studies, a paper on Faust, he furnished in 1821 to the *New Edinburgh Review*. During the two years following he had written the *Life of Schiller* (printed in instalments in the *London Magazine*, and published as a book in 1825), and had translated *Wilhelm Meister* published in 1824, in which year he followed the Bullers to London, on his first visit to that city. He soon grew dissatisfied with his connection with this family, and in July his engagement with it was terminated.

Irving some years back had been the tutor of Jane Baillie Welsh, daughter of Dr. John Welsh, who claimed to be a direct descendant of John Welsh, minister of Ayr, who had married the daughter of John Knox. Jane Welsh, who was born in 1801, had once been attached to Irving by a feeling much stronger than friendship, but his word, though not his heart, held him fast elsewhere. In 1821, Carlyle first met her, and for some time the disparity of their dispositions made anything beyond friendliness out of the question. But in 1825, the year in which he paid a twelve-days' visit to Paris, both found that they loved, though they were "not *in love*," as Miss Welsh wrote him. The same year he began the translations—"honest journey-work," he called them—known as *German Romance*, published in 1827 in four volumes. Miss Welsh had meanwhile been to see his mother at Hoddam Hill, where the Carlyles were then living. The romantic interference of a third person served to bring their union to a nearer issue, and in Oct., 1826, they were married and went to live at Comely Bank, in the vicinity of Edinburgh. The next year the *Edinburgh Review* accepted his articles on *Richter* and *The State of German Literature*. After much hesitation on her part, his wife and he removed to Craigenputtock ("craig of small hawks"), a dreary moorland farm, an inheritance of the Welshes, situated sixteen miles from Dumfries. Here they lived for six years, and here Carlyle found the sought-for opportunity for uninterrupted thought and work. During these years he contributed a number of articles to reviews, among them the brilliant paper on Burns. *Fraser's Magazine* was started in 1830, the first number containing an article by Carlyle, who remained a contributor throughout his life, though he spoke contemptuously of it as the "mud magazine." Jeffrey, then editor of the

Edinburgh Review, and in some way related to Mrs. Carlyle, paid a memorable visit, with his wife, to the lonely couple at Craigenputtock. Slight animosities, felt on account of Jeffrey's arbitrary changes in Carlyle's manuscript, were then smoothed away; but there afterwards arose a misunderstanding, of a different nature, which never quite disappeared. John, a younger brother, was then dependent on Carlyle while seeking a livelihood as a doctor in London. This burden and his own discouraging prospects had straitened Carlyle's circumstances, but he refused delicately a kindly offer from Jeffrey of an annuity of £100. Napier soon assumed the editorship of the *Edinburgh Review*, and for a time was friendly, though at last relations with him terminated suddenly. Between January and August, 1831, Carlyle had completed *Sartor Resartus*, which had to wait two years before it saw light, although he went immediately to London to dispose of the finished manuscript, and remained there with his wife during the winter of 1831–32. While there he suffered the loss of his father, who died Jan. 23, 1832. In April the two had returned to Craigenputtock. Goethe, with whom he had been in pleasant correspondence for several years, died in March, and in June appeared Carlyle's only contribution to the *New Monthly Magazine*, an article on "The Death of Goethe." The next winter was passed at Edinburgh. In Aug., 1833, there came to see Carlyle in his lonely retreat the then unknown Emerson, who has described the meeting in his *English Traits*. During 1833–34 *Fraser's Magazine* printed *Sartor Resartus* in instalments, at some risk to the publishers. Emerson, in 1836, edited it as a book in America, but no English edition appeared until 1838. Harriet Martineau, in her *Autobiography*, writes pleasantly of her bringing to Carlyle's house in Cheyne Row, Chelsea, whither he removed permanently in 1834, the proceeds of the sale of a few of the American copies in England. Soon after the removal to No. 5 Cheyne Row, a house built in 1709, the *French Revolution* was begun, and worked silently upon until 1837, with the exception of the publication of a few articles, outgrowths from the larger subject. After the completion of the manuscript of the first volume there befell the author a calamity, the complete destruction of this manuscript. The various stories of this catastrophe differ so that it is hardly safe to say more than that it happened at the house of Mrs. Helen Taylor, afterwards the wife of John Stuart Mill, who had carried the papers there and that these were probably used by some servant for lighting a fire. The work was at last made complete again, and the *French Revolution* appeared in 1837 in three volumes. Mill had the pleasure of promoting its immediate popularity by a friendly notice in the *Westminster Review*. John Sterling, too, in 1839 wrote in that review to the same end. A second edition appeared in 1839, containing an important and amusing correction of the totally false account of the sinking of the ship Vengeur in book v. chap. vi.

In 1837, Carlyle, who was not altogether unfitted for the demands of oratory, began a course of six lectures on "German Literature." The next year twelve lectures followed on the "History of Literature;" and in 1839 six lectures, with increased attendance, were given on "The Revolutions of Modern Europe." In 1840 six lectures on "Heroes and Hero-Worship" were delivered, and were the only ones published, appearing the next year in book-form, and gaining a popularity greater than any other of his works thus far. The first collected edition of his *Critical and Miscellaneous Essays*, in four volumes, appeared in 1839, containing nearly all his contributions to periodical literature since 1827. A second edition, in five volumes, was needed the next year, when also appeared two editions of his political tract *Chartism*. Fraser in 1841 republished Emerson's *Essays*, and Carlyle furnished a preface, recommending his friend to the "small thinking public." In 1844 he wrote a shorter preface to a second edition of these *Essays*.

While gathering materials for *Oliver Cromwell's Letters and Speeches* he published *Past and Present*, which furnished the basis of an article by Mazzini in the *British and Foreign Review* for Oct., 1843, on the "Genius and Tendency of Carlyle's Writings." In 1844 the shameless opening of Mazzini's private letters caused Carlyle's hearty indignation, though neither he nor his wife had political sympathy with the Italian patriot. Two volumes of *Cromwell* appeared in 1845, followed in 1846 by a supplementary volume. In the latter year Margaret Fuller, who then first saw him at his home, says: "He seems to me quite isolated—lonely as the desert. . . . He sings rather than talks. He pours upon you a kind of satirical, heroical, critical poem, with regular cadences." He edited and published in *Fraser's Magazine* for Dec., 1847, the *Squire Papers*, under the title of "Thirty-five Unpublished Letters of Oliver Cromwell," which form an appendix to later editions of *Cromwell*. The authenticity of these letters was foolishly questioned at the time. Emerson, who was lecturing in England in 1848, describes Carlyle as then "grown so fierce and savage that he should be afraid of trusting some of his more gentle and spiritually-minded friends in his presence." The friendship of Carlyle and Emerson indeed, about that time and for some time after, seems to have undergone something of a shock; but their *Correspondence* (2 vols., 1883) leaves no doubt as to the real depth of their mutual esteem of each other's spiritual worth.

The Revolution of 1848 and the terrible Irish famine were the subjects of a few of his rare contributions to journalism; and the year 1849 found him in Ireland in company with Mr. (now Sir) Charles Gavan Duffy. His journal of that trip was published by J. A. Froude in 1882. In November of 1848 the brilliant radical Charles Buller died, and a touching tribute was paid him in *The Examiner* by his old tutor and friend.

The Royal Commission appointed in 1849 to inquire into the constitution and management of the British Museum summoned Carlyle to testify. His outspoken opinions had their effect, though what he said cost him dearly in prejudicing against him Sir Anthony Panizzi, then Principal librarian. The preparation of *Cromwell*, and, earlier, of the *French Revolution*, had made it necessary for him to have access to much material, practically rubbish, but essential to his purpose. He found the British Museum quite inadequate to his needs, and did not hesitate to say so; but characteristically declined to be explicit as to better methods.

The sobering effect of the Revolution of 1848 upon that remnant of radicalism still left in Carlyle was seen in the now definite conservatism of those political articles—beginning in *Fraser's Magazine* for Dec., 1849, with the *Occasional Discourse on the Negro Question*, and continued from January to July, 1850—which form the notorious *Latter-Day Pamphlets*. After these scathing tracts on contemporary affairs it was natural that in 1851 (Crystal-Palace year) he refused to be present at the Peace Congress in London. This year

the *Life of John Sterling* was published. As the *Latter-Day Pamphlets* were intended for an unqualified condemnation of the drift of politics, so Carlyle meant to make the *Life of Sterling* the vehicle for delivering his opinions on religion, more particularly on the condition of the Established Church of England. The undertaking in itself was a criticism, if not a censure, upon the sketch by Archdeacon Hare prefaced to his edition, in two volumes, of Sterling's *Essays and Tales*, published in 1848. Hare's is the shorter, the more direct, and, in the opinion of some who knew Sterling best—among them, lately, Miss Caroline Fox—the one to be preferred of the two lives. There is little of a discursive nature in Hare's sketch, except towards the close, when he takes occasion to speak plainly, as a Churchman, about Sterling's final attitude of dissent from the Church. Carlyle, however, seems to have chosen the life of his friend as a text for a discourse upon the religious phases of the time. Sterling, as both biographers show, passed from an early radicalism, which was exploded suddenly by the immediate cause of the tragic end of some Spanish refugees who had enlisted his sympathy, to a gradually strengthened belief that the old Church, though seemingly inert, might be quickened by the infusion of a new and warmer spirit. To this position he had been brought, in a large measure, by a personal acquaintance with, and tutelage in, the philosophy of Coleridge, the sketch of whom in the eighth chapter of Carlyle's book is memorably vivid. This "thrice-refined pabulum of transcendental moonshine," to use Carlyle's words, had the effect, after the fever of radicalism had passed off, of determining Sterling to connect himself actively, in the office of deacon only, with the work of a curacy, under the guidance of Hare. In a few months he became convinced that active service in the Church in following his chosen model, the apostle Paul, was not the path for him; accordingly, pleading ill health as the cause, he withdrew from the curacy, and henceforth, with gradually increasing bodily infirmity, applied himself to literature bravely, but with little popular encouragement, until his death in the thirty-ninth year of his age. Sterling was a bright, impetuous thinker and worker. "Overhaste was his continual fault," says Carlyle of him; and yet in the matter of his religious estrangement Carlyle makes out his passage over the sea of religious doubt a more stormy one than it, in all probability, really was, though he is careful to insist upon Sterling's essentially pious nature; yet piety, he thinks, was not the "principle deepest in him." In his desire to show that holding aloof from participation in religious questions was the only position possible in his times for so candid a mind as Sterling's, may be seen perhaps a vindication of Carlyle's own attitude. Certainly no other of his writings comes so near to a discussion of those themes on which he generally chose to be silent.

Carlyle in 1852 visited Germany for the first time to examine some points in the life of his chosen hero, Frederick the Great. He returned in November, to begin in earnest the immense task of writing his most elaborate historical work. Finding himself baffled in an attempt to secure special privileges at the British Museum, he was obliged not only to find, but to buy, the needed books and pamphlets. On Christmas Day of 1853, Carlyle was with his mother when she died, at the age of eighty-three. The next few years, until the appearance of the first collected edition of his works in 1857–58 in sixteen volumes, saw little interruption in his studies, except a paper in the *Westminster Review* for Jan., 1855, *The Prinzenraub: a Glimpse of Saxon History*. It was intended that *Frederick* should be complete in four volumes, but it was barely compressed into six, the first two of which appeared in 1858. The next two years were spent quietly, varied by a visit in 1859, with his wife, to Fifeshire and Aberdour, and one in 1860 to Thurso Castle, the home of Sir George Sinclair. The third volume of *Frederick* appeared in 1862. He was then sixty-seven years old, and one who saw him at that time speaks of him thus: "Carlyle's long, wild gray hair hangs over his forehead. His eye is bright and lively, his complexion healthy, and his look generally betokens a man who leads a calm life. His wife told me she took in the *Daily Telegraph* in order to know what was going on in the world. Her husband never reads the papers." This habit of not reading the current news, though he used to look at *Public Opinion*, which was sent him, did not prevent his forming strong opinions of passing events. His feelings in regard to the Civil War in the United States are amply expressed in his *Ilias (Americana) in Nuce*, in *Macmillan's Magazine* for Aug., 1863. He did, in a slight measure, afterwards retract somewhat of his bitterness on this subject, which went so far as almost to induce him to write a pamphlet in support of "poor Davis." The fourth volume of *Frederick* came out in 1864, and the fifth and sixth in 1865. The next year Carlyle made his last great public achievement and passed through his greatest sorrow.

Mr. Gladstone had just retired from the office of Lord Rector of Edinburgh University, and in 1866 Carlyle was chosen to that office over Disraeli by the expressive vote of 657 to 310. On the 2d of April, 1866, in presence of a great audience, the new rector, after formal introduction to Sir David Brewster, who so many years before had found in him a faithful contributor to his *Encyclopædia*, began that famous *Address*, speaking without aid of manuscript. There is perhaps no better account of the occasion than that by Mr. Moncure D. Conway, as told in his *Thomas Carlyle*, published in 1881. On April 21, Carlyle being then away from home, Mrs. Carlyle, while taking her usual afternoon drive, died suddenly. She was buried with her kindred in Haddington. It was soon after, under the pressure of grief and remorseful fear that he had in her lifetime refused to see her worth, that Carlyle gave expression to the chapter upon his wife in his *Reminiscences*. To his own self-condemnations must be added the ample evidence in Mrs. Carlyle's *Letters and Memorials* that there were dreary passages in their wedded lives into which it is not decorous or profitable to inquire too deeply.

Shortly after this loss Carlyle became interested in supporting the side of Gov. Eyre in connection with the troubles in Jamaica, and accepted the position of the vice-president of the fund for the defence of the ex-governor against the charge of complicity in a massacre. In Aug., 1867, *Macmillan's Magazine* printed his *Shooting Niagara: and After?*—which has probably given more offence than any other of his writings. Some relief to his weary condition was found in revising the Library edition of his works between 1868 and 1871. Though withdrawn largely from public affairs, he expressed himself warmly on the side of Germany in the Franco-German War. In 1872 he superintended the cheap "People's Edition" of his works. *Fraser's Magazine* in 1875 contained his *Early Kings of Norway* and *The Portraits of John Knox*, his last effort.

His eightieth birthday was made an occasion for presenting him with a gold medal executed in his honor by Boehm, whose statue of Carlyle has been commended by Ruskin. Once in 1876, and for the last time in 1877, in the columns of *The Times*, he made himself heard, taking the part of Russia, then in war with Turkey. At last, not suddenly, but from long-continued weakness, he died, very quietly, on Feb. 5, 1881, in his eighty-sixth year. He was buried, not by the side of his wife, but with his father and mother at Ecclefechan.

Among other items of bequest, he left the books collected during the preparation of *Cromwell* and *Frederick* to Harvard University, from which in 1875 he had accepted the degree of LL.D., an honor he once refused from Edinburgh University. He refused also the grand cross of the Order of the Bath, offered by the Earl of Beaconsfield to him and Tennyson; he, however, received the chapter of the Civil class of the Prussian Royal Order "for merit," left open by the death of Manzoni—a distinction of more significance to him. There are of course several good portraits of him, one of the most accurate being taken from Boehm's statue, to be found in the (London) *Art Journal* for 1878.

In giving advice on literary matters it was Carlyle's wont to discourage the development of the poetic faculty. Conscious that the few serious attempts he made to construct verses were efforts at best, he confined himself to prose, and advised others to do the same. And yet his "Faust's Curse," from Goethe, and the "Sower's Song," are correct and pleasing, if nothing more. All his poetic feeling came out with more fulness in his prose. The first thing Carlyle ever wrote for publication, curiously enough, was fiction, a little story, *Cruthers and Jonson*, first printed in *Fraser's Magazine* for Jan., 1831. Of the *Edinburgh Encyclopædia* articles Lowell says: "Carlyle in these first essays already shows the influence of his master Goethe." They are noticeable for soundness, even maturity, of judgment. The *Life of Schiller*, to which in 1872 was added an appendix, more important now than the original work, is faithful and direct, but somewhat ornate and formal; Goethe, however, in a letter to Carlyle praised it, and wrote a preface to the German translation.

Of all his contributions to magazines and his minor writings, gathered up afterwards, with few exceptions, into his *Critical and Miscellaneous Essays*, it is not possible to speak adequately. For the most part, they are fragmentary results of his German studies, many of them portions of a never-published *History of German Literature*, or offshoots thrown out while writing his larger works. A few others, like the splendid paper on Burns, the *Signs of the Times*, and *Characteristics*, take rank with his more extended writings.

Sartor Resartus, the product of his lonely and embarrassed life at Craigenputtock is now known to be autobiographical in many incidents, and is the first utterance of his own beliefs, distinct enough if looked at closely. Sterling maintained that its tendency was pantheistic; but this is true only in that it holds that the universe is pervaded and formed by the Spirit of God. The earliest strong protest of this century against materialism, it embraces some of the essential points of Kantian transcendentalism. Creeds, systems, are all phenomena, not real in themselves; when no longer of use to be discarded, like worn-out clothes. "Truth," cries the hero, Teufelsdröckh, "though the heavens crush me for following her—no falsehood!" Teufelsdröckh has got no farther than doubt and despair when he has to decide (and this is autobiographical) between the "everlasting No"—continuance in intellectual fear—and the "everlasting Yea," which is "Love not pleasure—love God." This is similar to Goethe's utterance that "it is only with renunciation that life, properly speaking, can be said to begin." After chosing the everlasting Yea he can view with composure, though with sadness, the follies of the clothes-philosophy. One of the many passages of rare beauty is that where Teufelsdröckh sits in his lonely student-room brooding over the sleeping city beneath.

The *French Revolution* is properly an epic of the "destructive wrath of Sansculottism," "chanted," as Victor Cherbuliez says, "on his lyre, to which, for the occasion, he added a brazen string which made its tones truly diabolic." Carlyle is still carrying out in it the theory of *Sartor Resartus*. France was done with the ancient régime; Sansculottism rises, "many-headed, fire-breathing, and asks, What think ye of *me?*" But that too went down, because "it sought a lubberland of happiness, benevolence, and vice cured of its deformity." Carlyle, though his humor—and it abounds here—is at times bitter, has not lost pity and love for humanity, and is on the side of the Sansculottes, but only as they were less of a sham than kings, nobles, and priesthood. Descriptive power never went farther than his pictures of the procession of the States-General or of the taking of the Bastille. Montégut, writing in the *Revue des Deux Mondes*, says: "I prefer his history of the French Revolution to all those we have ourselves produced; I find it as dramatic, and, I will venture to say, more profound."

Of the four courses of lectures ("detestable mixture of prophecy and play-actorism," Carlyle afterwards called them) delivered between 1837 and 1840, there is unfortunately but one published, *Heroes and Hero-Worship*. Much cheerfulness and hope is still to be found in them. Progress, Liberty, Friends of the Species, were terms that did not evoke the contemptuous abuse of ten years later. It is congenial reading for those who wish to think of Carlyle as a hero, as a man of letters. *Chartism*, too, destined to be in a measure forgotten from the passing nature of its theme, takes a compassionate view of the destiny of oppressed classes, for whom he saw hopes of amelioration by the perfection of mechanical aids to labor. He did not believe in universal suffrage, the "count of heads and clack of tongues" of later years, but was then and always an advocate of popular education and of plans for emigration. He too, had England rejected his *French Revolution*, was ready to "buy a rifle and spade and withdraw to the Transatlantic wilderness, far from human beggaries and basenesses." He had already concluded that mankind needed not the power of deciding what is best for itself, but fit men—heroes—to decide for it. His later doctrine in its unlovely completeness was not proclaimed. This need of fit men he turns to account in *Past and Present* by a practical lesson having for a text the character of Samson, abbot of St. Edmundsbury, Suffolk, in the twelfth century, a life of whom was given in a chronicle written in Latin by Jocelin de Brakelond, edited for the Camden Society.

The rescue of the fame of Cromwell from oblivion, certainly from obloquy, by Carlyle's *Oliver Cromwell's Letters and Speeches*, will ever remain a remarkable literary "success." Hume's strangely false prophecy that "the collection of all his (Cromwell's) speeches,

letters, sermons, would make a great curiosity, and, with a few exceptions, might justly pass for one of the most nonsensical books in the world," is an instance of how the man was misunderstood. Cromwell's present position in English history is due, we must conclude, not only to the genius of Carlyle, but to the enormous amount of drudgery he bestowed upon his subject. Hero-worship is now fully enunciated. There must be self-abasement of the multitude before its leader, in whom must be palliated or ignored all the foibles censurable in common man. "He is thy born king, thy conqueror and supreme lawgiver. . . . The stars, keen-glancing from the immensities, send tidings to him." It is the weak who are to bear the infirmities of the strong; and the outcome is pure despotism. One result of this worship is the half-contempt in which Carlyle held men of great but not supreme ability. Hampden, Pym, the patriot Vane, are underrated. Lacking himself that repose often associated with great souls, which Goethe had in its perfection, Carlyle neglected to do justice to the men of a quieter sort. Washington, La Fayette, Lincoln, never attracted him as did stormy Mirabeau or coarse Frederick.

The Revolution of 1848 deepened Carlyle's faith in the worth and stern necessity of Puritanism, and his belief that things were gone wrong is made manifest in *Latter-Day Pamphlets*. With the wildest mannerisms of his style unrepressed, discarding all tenderness, his humor grown coarse, he lays about him thick and fast, aiming a blow wherever the rising democratic spirit shows its head. "Model Prisons" is as violent as any of these "Tracts for the Times." It vituperates, of course, the memory of John Howard and the results of his life. Carlyle goes to a prison and sees the "diabolical canaille" ("rotten, multitudinous canaille," he finds them later); they are roofed in, fed, and held fast; that is not enough for him; he wants for them "a collar round the neck and a cart-whip over the back."

What these *Pamphlets* were to politics the *Life of John Sterling* was to Christianity. We have in it Carlyle's most definite views of religion and literature. Sterling was first a radical, then became a curate—"went about among the poor, the ignorant, and those that had need of help," says Hare, his other biographer; then turned finally to literature, where, it is now admitted, he did little remarkable. He had pointed out in *Sartor Resartus* Carlyle's lack of sympathy with "the great body of those who are now endeavoring to guide and help onward their fellow-men;" but, soon won by the creed of hero-worship as thus far laid down, he seems to have thought of Carlyle, what Taine keenly says was Carlyle's own opinion, that he was "a great man misunderstood, of the race of heroes—that the human race ought advisedly to trust itself in his hands." Though there is in general a more subdued and even temper in this work, Carlyle at times bursts out in unmeasured scorn against the Christian ministry with such epithets as "black dragoons," "poor devils, shamming, and endeavoring not to sham." Contemptuous, too, is the vivid sketch of Coleridge, in which is ridiculed the very philosophy laid down, in some particulars, in *Sartor Resartus*.

The third and last great historical work, the *History of Friedrich II. of Prussia, called Frederick the Great*, was begun when Carlyle was fifty-eight. He says: "*Cromwell* was by much the worst book-time till this of *Friedrich*, which, indeed, was infinitely worse; . . . lasted for about thirteen years." It covers much more than the period of Frederick alone, and includes a history of the intricate connections of the Hohenzollerns with European politics. It has been the most severely handled of his works, except perhaps the *Latter-Day Pamphlets*. Few have been ready to accept the "veracity" of Frederick's father, Frederick I., in face of the lies he told. The judgment of history has not ratified Carlyle's approval of the seizure of Silesia from Maria Theresa of Austria, nor the subversion of the Pragmatic Sanction, by Frederick. Though the descriptions of the Tobacco Parliament, the battle of Hohenfriedberg, and the all-important study of Voltaire's relations with the Prussian court, show that little of Carlyle's literary dexterity was gone, still, the wild extravagance of style, the extreme conclusions of hero-worship, and the author's apparent loss of faith in his undertaking, tend to place *Frederick* below his other great efforts. Carlyle wrote two years after finishing it: "It is now become insignificant as the dung of a thousand years ago. I did get through, thank God; let it now wander into the belly of oblivion for ever."

As to his Lord Rector's address, his own words are comment enough: "No idea, or shadow of an idea, is in that address but what has been set forth by me tens of times before, and the gaping sea of Prurient Blockheadism receives it as a kind of inspired revelation."

Besides *Shooting Niagara: and After?* and *Portraits of John Knox*, there was one more book, *Early Kings of Norway*, said to have been written earlier in life, but the publication of which showed, in general opinion, that Carlyle was then (1875) a very old man.

In a touching passage of the *Reminiscences* of his wife there is an expression of Carlyle's own feeling in regard to the fate of his books: "No daughter or son of hers was to sit there; so it had been appointed to us, my darling. I have no book a thousandth part as beautiful as thou; but these were our only 'children'—and, in a true sense, these were verily ours; and will live perhaps some time in the world after we are both gone; and be of no damage to the poor brute chaos of a world, let us hope!"

The same charitable complaisance shown toward the failings of men of genius may in time be extended to the reputation of Carlyle; but at present those who still smart under his castigations cannot be said to be in a condoning mood. Hard but wholesome rebukes of existing shams, and forebodings of a speedy doom for institutions founded on unstable foundations, put Carlyle in the position at once of teacher and prophet. People are willing enough to listen to any strong voice which calls them away from the sordid cares of daily life and warns or exhorts them to higher efforts, yet they are by no means ready to obey injunctions other than those that cheer them onward in some self-chosen path. But when the teacher who would instruct has lost faith in even the intelligence of his disciples, his lessons are in danger not only of not being laid to heart, but of not being listened to. Had Carlyle died after he had written *Past and Present*, he would have been remembered as one who sought to dissuade men from the hollowness of metaphysical speculation on the one hand, and from the growing materialism of the present century on the other. Followers—the young for the most part, and those whose lot is at best a hard one—would have taken courage at his biddings to do the allotted work of life bravely and silently. It was a sad but not dispiriting creed. He lived, however, to write the *Latter-*

Day Pamphlets and *Frederick the Great;* and it is most certain he did not carry men's opinions with him. He added article after article to the dogma of hero-worship, until he finally came to disbelieve even in constitutional government. No amplified demonstration is wanted to show that the tendency of the times has been in another direction. Men turn away from him, as they turn from Kingsley and Ruskin, after first extracting what they think to be of real worth in what he said. Carlyle is by no means the only one of this age who has held that things never can be righted, but will grow worse until mankind submits itself to the immutable laws of the universe. He, however, in pointing, as he advanced, with the eagerness of a seer to the immensities and eternities, naturally stumbled over the problems of an every-day life which must be lived; and these problems he dashed aside with impatience. It was this characteristic impatience of methods which made him so scornful toward men like Bentham and Howard with their schemes of political regeneration or of philanthropy. Others, perhaps as anxious as he that eternal verities may prevail, cannot embrace that large optimism which made human slavery seem right in his eyes, because, as he thought, natural laws declared for it. There was also an immense deal of that Jesuitism for which he professed especial abhorrence in a creed which held that force, even brute force, might use monstrous means to gain ends to him holy.

Whoever looks at his life to find consistency begins a useless task, for there is in his nearly twoscore of volumes one grand inconsistency with his continual plea for silence. It is difficult, too, to make some of the facts of his private life stand the test of his lofty standard of truth and "veracity." After the fullest allowance that he was a man of genius tormented with dyspepsia (though Froude intimates that this trouble was exaggerated), and inheriting, from the circumstances of his origin, a suspicious aggressiveness towards others of gentler bearing, his manner of treating many who came in contact with him was open to the charge of being double-faced, because he received those as friends of whom he wrote, in secret, sentiments which, if suspected by them, would have speedily terminated all possibility of further acquaintance. Charles Lamb, who was a visitor at his home, he wrote down a "pitiful, rickety, gasping, staggering tomfool." There is more than a suspicion of insincerity in this confounding a man's moral weakness with physical infirmities not to be helped, in a sentence meant for posthumous publication, and not excusable in either a dyspeptic or a genius.

While there is perhaps not a person who has not gained strength by the mere reading of Carlyle's robust writings, it is safe to assert he has no prominent follower of his doctrines at present, nor is he likely ever to have, unless his prophecies come true. He taught the possibility of taking a broad view of men rather than a too searching inspection into their private conduct or their particular creed. Profiting by this example in his own case, some disregard may well be shown to the eccentricities and inconsistencies of a character of unassailable purity. As he was the most prominent English man of letters of this century, it is probable that there is to be an inquiry, already well begun, into his life and character not seen since the death of Dr. Johnson. Leaving out of the question the value of his writings, it is worth while, in forming an opinion of the man himself, to bear in mind Emerson's suggestion to him, that he ought to have inscribed upon the doorplate of his house the word "Whim," that people might know who lived there. (LL. S.)

CARNOT, LAZARE HIPPOLYTE, a French statesman and author, a son of the famous war-minister, was born at Saint-Omer, April 6, 1801. He accompanied his father in exile in 1815, and passed seven years at Magdeburg. He returned to France in 1823, studied law, and became a moderate follower of Saint-Simon. He was elected to the Chamber of Deputies in 1839, 1842, and 1846, and was minister of public instruction from February to July 5, 1848. In 1848 he was elected a member of the Constituent Assembly for the department of Seine. After the *coup d'état* of Dec. 2, 1851, Carnot was elected to the Corps Législatif by the voters of Paris, but he refused to take the oath and retired to private life. In 1863 he was again elected, and took his seat, but in the election of 1869 he was defeated by Gambetta. In February, 1871, he was elected to the National Assembly, in which he voted with the Republican Left. He was chosen a senator for life in December, 1875. He died at Paris, March 16, 1888. Among his works are *Exposé de la Doctrine Saint Simonienne* (1830); *Mémoires de Bertrand Barère*, with David d'Angers (4 vols., 1842–43); *Mémoires sur Carnot par son Fils* (1864); and *Lazare Hoche* (1874).

CARNOT, MARIE FRANCOIS SADI, eldest son of preceding, was born at Limoges, Aug. 11, 1837. He studied at the Ecole Polytechnique, and became by profession a civil engineer. His entrance into political life took place in 1871, when he was elected to the National Assembly. In 1879 he became minister of finance in the Brisson cabinet, and in the Freycinet cabinet of 1885 took the portfolio of public works, and afterwards that of finance, but when his recommendations were defeated, he retired in December, 1886. His course of action was sustained by the country, and on the resignation of President Grévy in December, 1887, Sadi Carnot was elected president of the French Republic, a position which he has since filled with ability and public satisfaction.

CARO, ELME MARIE, a French philosopher and author, was born March 4, 1826, at Poitiers, where his father was professor of philosophy. He was descended from an old Breton family of Morbihan. He studied in Paris at the Collège Stanislas from 1839 to 1845, and obtained the prize in philosophy at the general competition of the colleges of Paris. He then passed to the École Normale, where he completed his studies in 1848. After teaching and lecturing in the lyceums of Angers, Rouen, and other cities, he became professor of philosophy at Douai, and in 1858 was called to the École Normale of Paris as master of the conferences of philosophy. In 1864 he was chosen to the professorship of philosophy in the University of the Sorbonne, and in 1869 was made a member of the Academy of Moral and Political Sciences. In 1873 he was admitted to the French Academy, and in 1877 was made an officer of the Legion of Honor. In the early part of his career he published an essay on *Saint Dominique et les Dominicains*, and later a sketch of the theosophist Saint-Martin (1854). Several of his contributions to reviews were collected under the title *Études morales sur le Temps present* (1855), and the work was crowned by the French Academy. He afterwards published *Nouvelles Etudes* (1875), *Les Jours d'Epreuve*, 1870–71 (1872), *La Fin du 18me Siècle*, which discussed also the philosophy of that time, and thus formed a connecting link with his philosophical works. The principal of these are—*L'Idée de Dieu et*

ses nouveaux Critiques (1864; 6th ed. 1878); *Le Matérialisme et la Science* (1868), in which he opposes the idea that materialism is a necessary result of scientific study; *Les Problèmes de Morale sociale* (1876); *Le Pessimisme au 19me Siècle* (1878). His last work, published in the *Revue des Deux Mondes* in 1882, is an exposition and refutation of the Positive philosophy, under the title of *M. Littré et la Positivisme*. During the sixteen years of his professorship at the Sorbonne he discussed all the problems of modern philosophy, maintaining with great ability the existence of soul and spirit against Positivism as well as against scientific materialism. His idealism, his love of poetry as well as of the deepest problems of metaphysics, and his profound reverence for Christianity, may be partly attributed to his Breton origin. To the simple faith which characterizes the natives of that region he joins the acuteness and learning of the mediæval philosophers. His style is clear and brilliant, rendering his discussions of philosophy attractive even to general readers. In contrast with most of the contemporary French critics, He gave prominence to the ethical aspects of literary questions. He died at Paris, July 13, 1887.

CAROB TREE, ALGAROBA, LOCUST TREE, and ST. JOHN'S BREAD (Arabic, *Kharrúb*, a carob), names applied primarily to an Old-World leguminous tree having a wide geographical range. The carob tree, or Old-World algaroba, as generally understood, is *Ceratonia Siliqua;* the South American algaroba, *Prosopis dulcis;* the Chilian algaroba, *Prosopis siliquastrum;* the Texan algaroba, *Prosopis glandulosa;* while a species which by its husks and seeds furnishes the Chilians with a famous tannin material is *Prosopis pallida*. The name *Siliqua*, which means simply "pod," Pliny applies without qualification to the carob, and hence the modern botanical term.

The fruit is frequently sold in the larger cities of the United States under the names of carob and St. John's bread, being imported from the Mediterranean. The great number of exhibits from Europe in which the carob appeared at the United States Centennial Exhibition in Philadelphia proved the importance attached to it in the Old World. The usual length of the dark-brown pods is about six inches, and they are about a quarter of an inch thick, but some on exhibition were ten inches long and of a proportionate thickness. These improved varieties are propagated by grafting, the art of doing which, and indeed the whole culture of the tree, is the subject of a goodly-sized French work, *Du Caroubier et de Caroube*, by Bouzom, Delamotte, and Rivière, published in Paris in 1878. As a general rule, the culture is left to nature, and especially so in the dryer or almost desert regions of the south of Europe and the north of Africa, where the tree seems to delight to grow. In Syria and Egypt especially the fruit is superior, and though carobs from most of the other parts of Europe are chiefly used as food for horses, sheep, and swine, those from these countries are esteemed excellent human food. In the ruins of Pompeii some carob-pods were found in the food-closets. Improved varieties are planted largely by the French in Algeria at the present time. The ancient Hebrews made a preserve by boiling the pod with sugar; the refuse made excellent food for swine, and this is supposed to be the "husks" referred to in the story of the Prodigal Son, though from the derivation of the name there seems to be no reason why the whole fruit or pod might not have been intended. The trees, however, appear to have been wild and abundant, and there should have been no difficulty in obtaining them. Some modern commentators, having no knowledge that the locust insect was eaten by the ancients, supposed this tree must be the locust on which John fed when in the wilderness, and that the "honey" was also the product of this tree. This is the origin of the name St. John's bread. But the food of the prophet was undoubtedly the insect, and the honey that furnished by bees. The tree is not distantly related to the *Gleditschia triacanthos* of the United States, the "honey locust," to which it has furnished the common name. It makes a beautiful round-headed tree, with glossy, somewhat glaucous and evergreen foliage, but it will not endure the frost. It might be valuable for planting in the dryer regions of the American continent.

CARPENTER, MARY (1807–1877), an English philanthropist, was born at Exeter, England, April 3, 1807. Her father, Rev. Dr. Lant Carpenter, was the pastor of a Unitarian congregation there, but in 1817 he removed to Bristol. Besides his pastoral duties he had a small school of boys, and Mary was educated with them. She early manifested an earnest religious spirit. When, in 1829, her father was compelled to relinquish his school, she and her sister Anna opened a school for girls. The famous Brahman, Rajah Rammohun Roy, who had renounced idolatry, came to England in 1833, and died at Bristol. The interest excited by this remarkable man was shown in later years by her narrative of the *Last Days of Rammohun Roy* (1866). Another visitor, Rev. Joseph Tuckerman of Boston, was the means of directing her to her work in life. Under his influence, in 1835 she founded a working and visiting society, by which much was done to improve the condition of the poor. After the death of her father in 1839 she continued her school and charitable work, and in 1845 published a little devotional work called *Morning and Evening Meditations for Every Day in the Month*. This passed through several editions in England and America. Through Unitarian friends in Boston she was led to take an interest in the efforts for the abolition of slavery in America, and many distinguished leaders of that cause visited her. In 1846 she began her special work for destitute children by opening a ragged school in Bristol, which was successful from the start. Two years later she gave up home-teaching, and thus had time to prepare a *Life of Rev. Dr. Tuckerman* (1848), which was soon followed by *Ragged Schools, their Principles and Modes of Operation* (1849). Looking still farther into the needs of her country, she published in 1851 *Reformatory Schools for the Children of the Perishing and Dangerous Classes and for Juvenile Offenders*, in which she urged the necessity not only of reformatory schools, but also of good free day-schools, of industrial schools, and compulsory attendance. A conference was held Dec. 30, 1851, to help this movement, and a parliamentary committee of inquiry into juvenile delinquency was appointed. To give a practical example of what was needed, she opened in Sept., 1852, a private reformatory school at Kingswood, four miles from Bristol, in a house built by Rev. John Wesley for himself. Her next book, *Juvenile Delinquents, their Condition and Treatment* (1853), pointed out the evils of massing together hundreds of vicious youths, and other defects of the system then in vogue. In 1854 she removed the girls of the reformatory school to a building in Bristol called Red Lodge, taking the sole management of it, and soon after took up her residence in a house adjoining. A national reformatory union was formed in

1856, and before it she read papers in that year and later. From the formation of the Social Science Association in 1857, under the presidency of Lord Brougham, until her death, she took an active interest in its proceedings, contributing every year one or more essays on the subjects which engrossed her thoughts. In 1858, Miss Frances Power Cobbe, returning from a visit to the East, became an assistant in the reformatory work, and took up her residence at Red Lodge. Miss Carpenter was diligent in calling the attention of Parliament to the need of reforms in regard to education. In 1859 she published *The Claims of Ragged Schools to Pecuniary Aid from the Annual Parliamentary Grant.* Pursuing the plan she had followed in founding a ragged school, she now, without waiting for Government action, established a certified industrial school. In June, 1861, she was called to give her testimony before a Parliamentary committee on the education of destitute children, and published a pamphlet, *What shall we Do with our Pauper Children?* A change in the laws with regard to schools now deprived the ragged schools of aid, and against this she vainly protested. Still continuing her labors, public and private, she published in 1864 *Our Convicts*, calling attention to the defects in the English mode of treatment, and the improvements which had been introduced in Ireland by Sir Walter Crofton, as well as to the agencies for the prevention of crime. This work was very favorably received in England, and was warmly commended in other countries, but was placed on the *Index Expurgatorius* at Rome. About this time the interest in India which had been implanted in her mind in early life, but had long been restrained by circumstances, was revived, so that she felt compelled to visit that land. Before leaving England, though now in her sixtieth year, she did a vast amount of work, that the various institutions with which she was connected might not suffer in her absence. The Government sent a recommendation of her to officials in India, declaring that "Miss Carpenter's opinion had for many years been sought and listened to by legislators and administrators of all shades of political opinion." Landing at Bombay, Sept. 1, 1866, she soon found before her an immense field calling for new activities. The first thing she noticed was the want of female teachers, and she urged on the Indian Government the establishment of female normal schools. She visited Poona, Madras, and Calcutta, where she was invited to the palace of the governor-general, Lord Lawrence. Her influence on the natives, both men and women, was very great, as they were astonished that a woman should come alone, at her own expense, thousands of miles to visit them and do them good. Even some who resided in distant parts of India sent her tokens of their regard. As she had opportunity she addressed the natives on subjects pertaining to their welfare, and these *Addresses to the Hindoos* were published in London and Calcutta. Upon her return to England, she gave the result of her observations in a book called *Six Months in India* (1868). The work begun there needed her fostering care, and she went back in Nov., 1868. She became, without salary, lady superintendent of a normal school in Bombay, but an alarming illness in February following obliged her to return to England. Quickly she recovered, resumed her various labors, and in the autumn again made a short visit to India to stimulate and encourage those who were engaged in educational work. Henceforth, she felt there was not the same necessity for her immediate presence, but at the suggestion of some Hindoos she founded in Sept., 1870, at Bristol, a national Indian association, by which public opinion both in England and India might be influenced in favor of the changes she had inaugurated. In Jan., 1872, she turned her ragged school into a day industrial feeding school, so as to reach a still lower class of neglected children. In July the International Prison Congress met in London, and for this she prepared a little work on the Crofton system, besides taking an active part in its proceedings. She then went to Darmstadt to assist in organizing a congress called by Princess Louise of Hesse to consider woman's work, and after the congress visited Switzerland. In 1873 she visited America, travelling from Boston southward to Fortress Monroe, where she attended the commencement of Hampton College for colored people, and then northward to Montreal. In all the cities she found troops of friends and numerous demands for her services in explaining reformatory work. The jail at Montreal she pronounced the worst she had ever seen, and immediately called Lord Dufferin's attention to it. She also sought to learn the condition of the Indians, and afterwards brought their needs before the English public. In the autumn of 1875 she made another visit to India, and was cheered on examining the practical results of the innovations and improvements she had suggested. Drawing near her seventieth year, she printed for circulation among her friends a little volume of poems, *Voices of the Spirits and Spirit Pictures.* Her work was done, and she quietly passed away, June 15, 1877. The citizens of Bristol have perpetuated her memory by an association to support homes for working boys and working girls, and a memorial tablet has been placed in Bristol cathedral, with an appropriate inscription by Rev. Dr. James Martineau.

CARPENTER, MATTHEW HALE (1824–1881), an American statesman, was born at Moretown, Vt., Dec. 22, 1824. His father having died when the boy was only nine years old, he was adopted into the family of Paul Dillingham, afterward member of Congress and governor of Vermont. After studying in 1843 and 1844 at the U. S. Military Academy, he studied law, and was admitted to the bar (1845), but afterward went to Boston and was received as a student into the law-office of Rufus Choate, who, perceiving the ability of the young man, gave him his entire confidence and encouragement. In 1848, Carpenter removed to Wisconsin, but, being stricken with inflammation of the eyes, went to New York for treatment. During three years of total blindness Choate supported him. Upon his recovery he returned to Wisconsin, and entered at once upon a successful practice. In 1855 he married Caroline, the youngest daughter of Gov. Dillingham, his early benefactor and friend. During the War of the Rebellion, Mr. Carpenter, barred on account of his imperfect sight from entering the army, lent to the Union cause the inspiration of his eloquence. In 1868 he delivered in the McCardle case an argument which at once gave him a position among the great constitutional lawyers of America. In 1869 he was elected to the United States Senate, and in 1873 became president *pro tempore* of that body. In 1879 he was again elected to the Senate, but his health gradually failed, and he died in Washington, Feb. 24, 1881, and was buried at his home in Milwaukee, Wis.

CARPENTER, WILLIAM BENJAMIN, C. B., LL.D., an English physiologist, was born at Exeter, Oct. 29, 1813. He is the eldest son of Rev. Dr. Lant Carpenter, a distinguished Unitarian theologian. His family having removed to Bristol in 1817, he was educated in

that city, and there began the study of medicine, which he afterwards continued at London and Edinburgh. In the latter city he joined the Royal Medical Society, and as its president delivered the oration at its centenary commemoration in Feb., 1837. A paper which he read before this society "On the Voluntary and Instinctive Actions of Living Beings" contained the germ of much that he subsequently published on the nervous system. By his essay "On the Difference of the Laws regulating Vital and Physical Phenomena" he obtained the students' prize of £30, with which he purchased a microscope. In 1837 he became lecturer on medical jurisprudence in the British Medical School, and in 1838 published the first edition of his *General and Comparative Physiology*. In 1839 he obtained the degree of M. D. from the University of Edinburgh, and to his thesis a gold medal was awarded. Devoting himself specially to the study of physiology, he declined medical practice, and preferred to gain his livelihood by lecturing and authorship. In 1844 he was appointed Fullerian professor of physiology in the Royal Institution at London, and was also made a fellow of the Royal Society. In 1845 he began to lecture on general anatomy and physiology at the London Hospital. He was afterwards an examiner in the University of London and a lecturer on geology in the British Museum. When Dr. Forbes retired from the editorship of the *British and Foreign Medical Review*, the *Medico-Chirurgical Review* was united with it, and Dr. Carpenter, who had been a constant contributor on physiological subjects, was made the editor. In 1849 he was appointed professor of medical jurisprudence at University College, and in 1852 became principal of University Hall. Finding that this accumulation of duties interfered with his scientific investigations, he retired from the editorial chair, and thoroughly revised his great work on physiology, which he now divided into three —*Human*, *Comparative*, and *General*. In 1856 he was elected registrar of the University of London, and two years later, when the duties of this position were increased, resigned all other appointments, though he continued his original researches, especially on the *Foraminifera*. In 1868 the Royal Society, of which he was a vice-president, applied, at his suggestion, to the Government for the use of a vessel to carry on biological investigations in the deep sea. The request was granted, and Dr. Carpenter and Prof. Wyville Thomson sailed in the summer of that year in the Lightning. So great was their success that in the next year another voyage was made in the North Atlantic Ocean, and in 1870 and 1871, Dr. Carpenter went to the Mediterranean in the same way and for the same purpose. These deep-sea investigations aroused a remarkable interest, and preparations were made to carry them out on a still more extensive scale by the Challenger expedition. Dr. Carpenter would have taken charge of the expedition had not his friends dissuaded him on account of his age. In 1871 he was elected president of the British Association at its meeting in Edinburgh, and received the degree of LL.D. from the University of Edinburgh. In 1875, in recognition of his public services, he was made C. B. by the queen. In 1879 he resigned the registrarship of the university, and determined to employ his time entirely in original researches. In Sept., 1882, he visited the United States, attending the Unitarian convention at Saratoga and delivering a course of lectures before the Lowell Institute of Boston. The various publications of Dr. Carpenter have done much to diffuse a correct knowledge of physiology. He died at London, November 19, 1885. He contributed much to the *Cyclopædia of Anatomy and Physiology*, to the *Reports of the British Association*, the *Quarterly Geological Journal*, and the *Philosophical Transactions*. His chief works are—the *Principles of General and Comparative Physiology*, *Principles of Human Physiology* (9th ed. 1881), *Principles of Mental Physiology* (5th ed. 1879), *The Microscope and its Revelations* (6th ed. 1881), *Introduction to the Study of the Foraminifera*, *Physiology of Temperance and Total Abstinence* (1870).

CARPET-MAKING IN AMERICA. This industry is fairly entitled to consideration as one of the most progressive of the varied and important manufacturing interests of the United States.

See Vol. V. p. 112 Am. ed. (p. 127 Edin. ed.).

The first American carpet-manufacturer of whom there seems to be authentic record was William Peter Sprague, who some time prior to 1791 established a small factory for the weaving of Axminster carpeting in a part of the city of Philadelphia known as The Northern Liberties, and who came into public notice in that year through weaving an emblematic carpet for the United States Senate chamber, then situated in Philadelphia.

From 1791 to 1827 the carpet-mills established in the United States were few in number and small in productive capacity. During the latter year an incorporated company, organized by Orrin Thompson, commenced the manufacture of ingrain carpeting at Tariffville, Conn., with H. K. Knight as superintendent. The Tariffville mills speedily grew to pretentious proportions, and others were erected in Thompsonville by the same proprietor. This firm, however, failed, and their mills, originally started with only a few hand-looms, were bought by the Hartford Carpet Company, which was organized for that purpose. A few years later, the mills at Tariffville being destroyed by fire, the company abandoned that place and enlarged and improved the mills at Thompsonville, where there are now in active operation about 400 power-looms (in addition to a limited number of hand-looms) engaged in the manufacture of moquette, Wilton, and body Brussels, and three-ply and extra-super ingrain carpeting.

In 1828 the Lowell Manufacturing Company of Lowell, Mass., was organized. This corporation, now one of the largest carpet-producing companies in America, purchased the looms of a small factory started in Medway, Mass., in 1826, by Henry Burdett, of which Alexander Wright was superintendent. The Lowell Company was the first in the world successfully to manufacture carpeting on a power-loom, which they did in 1841, since which time they have added to their machinery till they are now running in the manufacture of Wilton and body Brussels and three-ply and extra-super ingrain carpeting nearly 350 power-looms, and have erected additional buildings with a view of starting about 60 more Brussels looms and many more ingrain looms.

In 1829, Andrew McCallum commenced the manufacture of ingrain carpeting at Germantown, Pa., thus laying the foundation for the Glen Echo carpet-mills, of which McCallum, Crease & Sloan of Philadelphia, Pa., are the proprietors, and of which the product of Wilton, body Brussels, and ingrain carpeting has been greatly increased through the erection of new mills at Wayne Junction in the northern suburbs of Philadelphia.

In 1834 there were about twenty carpet-factories in the United States, operating 511 hand-looms, of

which looms there were employed in the manufacture of body Brussels carpeting 18; three-ply ingrain, 21; other grades of ingrain, 424; Venetian, 44; and damask Venetian, 4. Besides these, however, there were several hundreds of hand-looms used in the making of rag carpeting. In 1810 the carpet product of the country was computed to be 9984 yards, of which 7501 yards was reported as having been made in the city of Philadelphia alone; while in 1834 the product of the twenty factories then in operation was reported to be 1,147,500 yards, of an average value of about $1 per yard, there being, of body Brussels carpeting, 21,600 yards; three-ply ingrain, 31,500 yards; other grades of ingrain, 924,000 yards; Venetian, 132,000 yards; and damask Venetian, 8400 yards. In addition to this product, however, large quantities of rag carpeting, which cannot be accurately estimated, were made by families in nearly all parts of the country, the weaving of floor-covering and coverlets being then a common and familiar household employment.

About 1830 a little ingrain factory was started in the village of West Farms, near New York City, by Alexander Smith, from which originated the spacious mills of the Alexander Smith & Sons Carpet Company, situated at Yonkers, N. Y. These mills are among the largest of their kind in the United States. They are used for the manufacture of tapestry Brussels carpeting, in which 185 power-looms are employed, and of patent Axminster and moquette carpeting, in which 160 power-looms are employed. Like all the other American carpet-mills of this class, they are provided with ample spinning machinery and every modern appliance for transforming unwashed wool into yarn and worsted and weaving it into carpeting.

In 1840, A. & E. S. Higgins (now E. S. Higgins & Co., New York) started thirty ingrain hand-looms in Harsimus, Jersey City, N. J. They subsequently had a small mill in Brooklyn in 1844, which was destroyed by fire, and also carried on the manufacture of carpeting at Astoria and Haverstraw, N. Y., and at Paterson, N. J. In 1847 they erected extensive and substantial mills near the North River, on Forty-third Street, New York City, which they have since enlarged, and in which they are now running, besides extensive spinning machinery, upward of 260 power-looms engaged in the manufacture of velvet, Wilton, body Brussels, and tapestry Brussels, and various grades of ingrain carpeting. In 1840 also Robert Beattie, lately deceased, commenced the manufacture of ingrain carpeting on a small scale in New York City, whence in 1843 he moved to Little Falls, N. J., where the Beattie Manufacturing Company, organized in 1882, is now operating the Little Falls carpet-mills and the Little Falls felt-mills, which produce, in the aggregate, a large quantity of Brussels and velvet carpetings and felt and woven druggets.

The decade extending from 1840 to 1850 was characterized by greater progress than that of any previous decade, inasmuch as it was during this period that the power-loom was first successfully applied to the manufacture of carpeting, and also because, on account of the impetus imparted to carpet-making by this successful application, several extensive new carpet-mills sprang into existence, and the productive capacity of those previously established was immensely increased through extensive supersedure of the slow and clumsy hand-loom by the more swift and ingeniously-constructed power-loom. During this decade Erastus B. Bigelow, who was the first successfully to apply power-looms to the manufacture of carpeting, began to produce power-loom Brussels carpeting with his brother, H. N. Bigelow, in 1847, at Clinton, Mass.; and among other new factories founded were the mills of the Roxbury Carpet Company, which were started in 1848. The experiments of the Messrs. Bigelow resulted in 1854 in the incorporation of the Bigelow Carpet Company, which now has extensive spinning-mills and carpet-factories at Clinton, where there are about 50 power-looms engaged in the manufacture of Wilton and 100 power-looms in the production of body Brussels carpeting. The Roxbury Carpet Company has its mills at Roxbury, Mass., where it is operating 170 looms in the manufacture of tapestry Brussels, making also a limited quantity of tapestry velvet carpeting.

Among other carpet-mills of comparatively early origin in the State of New York, which are still in operation, may be mentioned those of Josiah Barber & Sons (established in 1832) and Nye & Wait (established in 1852) at Auburn, and of C. M. & E. P. Pelton (established in 1836) at Poughkeepsie, all of which produce only ingrain carpeting. Another of the large mills of New York State is that of Stephen Sanford, which from a small ingrain mill, started many years ago, has grown to be a factory in which 186 power-looms are employed in making tapestry Brussels carpeting, 60 power-looms in making three-ply carpeting, and about 125 hand-looms in making three-ply and tapestry ingrain carpeting. There are also in Glenham, N. Y., the Glenham Carpet-mills, started by the late A. T. Stewart & Co. in 1876, which are now running about 150 power-looms in the manufacture of body Brussels, tapestry velvet, and extra-super ingrain carpeting.

A new branch of carpet-making in America came into existence in 1849, when the Dolphin Manufacturing Company commenced the production of hemp or jute carpeting at mills established in Paterson, N. J., in 1844, for the manufacture of sailcloth. The Dolphin mills have been extensively enlarged since their beginning, and now employ about 900 operatives in the manufacture of upward of 2,000,000 yards of carpeting per year, besides large quantities of yarns and other fabrics of jute. Another large factory of this kind is that of the Planet Mills Manufacturing Company, situated in Brooklyn, N. Y. The Planet mills, which were built in 1869 and destroyed by fire and rebuilt in 1875, employ about 500 operatives, and produce about the same quantity of carpeting as the Dolphin mills, in addition to large quantities of yarns and of canvas used for floor oil-cloth foundations. The Columbia jute-mills of Philadelphia, Pa., and the Chelsea jute-works in New York City, also manufacture hemp carpeting, but on a smaller scale than the Dolphin and Planet mills.

The great carpet-making centre of America is the city of Philadelphia. Taking the lead in the volume of production at the very outset, this city has steadfastly maintained her prestige, and her factories to-day supply about three-fifths of the entire carpet product of the country. A history of the rise and progress of her 234 carpet-factories would fill a good-sized volume, and cannot, of course, be here given in detail, though a few of her many extensive mills may be briefly mentioned

The oldest carpet manufactory in Philadelphia is probably that in which John Bromley began to manufacture ingrain carpeting with a single hand-loom in 1845. His business steadily increased, and before his death in 1883, his humble enterprise had, by the assistance of his sons, developed into extensive factories, in which were upwards of 350 looms employed in the

manufacture of body Brussels, ingrain, and Smyrna carpetings. James, George D., and Thomas H. Bromley, three of the sons of John Bromley, withdrew from partnership with their father in 1869, and under the style of Bromley Brothers started a large mill for the manufacture of ingrain and Venetian carpeting. In 1881, Thomas Bromley bought out his two brothers, who, under the firm-name of James and George D. Bromley, started another large ingrain mill, so that the father and his sons are now proprietors of three separate mills, all of extensive capacity.

Another of the extensive carpet-manufacturing firms of Philadelphia is that of John & James Dobson, proprietors of the Falls of Schuylkill carpet-mills. This firm started as woollen manufacturers in 1857, and in 1871 added carpet-making as a branch of their business. Their spinning- and carpet-mills are among the largest in the country, and employ about 400 looms in the manufacture of ingrain, Venetian, and loop and cut-pile carpeting of nearly every description.

Horner Brothers, with whom we must close this part of our sketch, though not among the oldest of the Philadelphia carpet-manufacturers, are among the most extensive, and a new mill erected by them about two years ago is commonly regarded as the handsomest carpet-factory in the United States. They employ about 125 hand-looms in the manufacture of Venetian stair-carpeting, 61 power-looms on body Brussels carpeting, and have just commenced to produce tapestry Brussels, for which they employ 36 power-looms. They are now extending their weave-shed to accommodate 36 additional looms for the manufacture of body Brussels.

Statistics.—The extent of carpet-making in the United States has formed a subject for much discussion during several years past. Well-informed experts differ considerably in their estimates, but all place the productive capacity much higher than that accorded by the Government census, which they unanimously declare to be imperfect. The most trustworthy, and, in fact, the only thorough private census of carpet-making ever undertaken and completed, is undoubtedly that of Mr. Lorin Blodget, editor of the Philadelphia *Textile Record*, who, after a laborious canvass, compiled very comprehensive statistical details concerning the carpet-mills of Philadelphia at the beginning of 1880, of which a summary is as follows:

Number of carpet-manufacturers in Philada.....	216
" " power-looms " "	1,346
" " hand-looms " "	4,132
" " yards produced per year.....	33,076,800

A general increase of about 20 per cent. is estimated to have ensued in the carpet-producing capacity of Philadelphia since the close of 1879, and from the data furnished by the private census just quoted, together with personal investigations by the writer, and information obtained from *The Carpet Trade and Review* of New York and other sources of admitted authenticity, it would appear that the following are approximate general statistics concerning the carpet-mills of the United States and their productive capacity:

Number of carpet-manufacturers in U. S.....	340
" " " power-looms " "	4200
" " hand-looms " "	5000
" mill-operatives " "	22,000
" yards of carpeting annually made in U. S.....	63,000,000
Value (average of 80 cents per yard)	$50,400,000
Capital invested in carpet-making in U. S.....	25,000,000

The various kinds of carpeting which compose the foregoing estimated product, and the respective quantities computed to be made of each variety, are as follows:

Two-ply cotton ingrain, yards.....	13,500,000
Two-ply woollen " "	13,000,000
Three-ply " " "	900,000
Tapestry Brussels, "	13,500,000
" velvet, "	1,000,000
Body Brussels, "	7,500,000
Wilton, "	600,000
Moquette, "	1,200,000
Axminster, "	250,000
Damask, "	2,250,000
Venetian, "	2,000,000
Hemp, "	5,500,000
Smyrna, "	300,000
Rag, list, etc., "	1,500,000
Total estimated production in yards.....	63,000,000

It is estimated that the carpet-mills of the United States annually consume about 70,000,000 pounds of wool, 22,000,000 pounds of cotton, and 22,000,000 pounds of jute, besides immense quantities of dyestuffs and other materials.

The geographical distribution of carpet-making in America, in comparison with the insignificance of the quantity manufactured in a few isolated sections of the country, is not specially extensive, the industry being mainly confined, as shown in our opening historical sketch, to the States of Pennsylvania, New York, Massachusetts, and Connecticut, these four commonwealths furnishing about 95 per cent. of the aggregate carpet-product of the Union. The District of Columbia and the States of Maryland, New Hampshire, New Jersey, Wisconsin, and Ohio produce the remaining 5 per cent., but their manufacture consists chiefly in the weaving of rag and list carpeting and low-grade ingrain carpeting on hand-looms, though, as already shown, there is a well-equipped carpet-mill (established forty-two years ago) in New Jersey, at which several grades of loop and cut-pile and felt carpeting are made, besides a large mill for the manufacture of hemp carpeting (established prior to 1850) in the same State.

Improvements in Machinery.—Scarcely more than twoscore years ago carpeting of all kinds and in all countries was woven only on hand-looms. Since then improvements in appliances for its better and speedier manufacture have gone hand in hand with the great increase of productive capacity of which they are a necessary adjunct. American inventive genius has been proverbially prolific in this field of enterprise, and has thereby conferred great benefit upon manufacturers both at home and abroad. Among the almost innumerable inventions of this class conceived in the United States there have naturally been some good and some bad, but of the failures we have no time to write, and for the American patents which have demonstrated their utility we have space only briefly to mention a few of the most prominent which are now in common and, seemingly, permanent use.

The rapid production of carpeting, not only in America, but also in all other countries, received its first genuine and practical impetus from Erastus Brigham Bigelow, an ingenious American inventor and a skilful manufacturer, who was born in the village of West Boylston, Worcester co., Mass., on April 2, 1814, and who died in Boston, Mass., on Dec. 6, 1879. In 1839, Mr. Bigelow invented a power-loom for weaving two-ply ingrain carpeting, which at that time was laboriously and slowly woven on hand-looms at the average rate of

only from seven to eight yards per day for each loom. Mr. Bigelow's ingrain power-loom was at first capable of weaving only from ten to twelve yards of carpeting per day, but this capacity was soon increased to from twenty-five to twenty-seven yards, and subsequently to a considerably greater quantity.

The successful invention by Mr. Bigelow was preceded by an unsuccessful one by John Haight of the New Jersey Carpet-manufacturing Company, who, on May 17, 1834, was granted a patent for an ingrain power-loom, which was undoubtedly the first ever invented. By Mr. Haight's loom, however, the patterns of the carpeting which it produced would not match, so it was abandoned in 1836, and its proprietor reluctantly returned to the use of the hand-loom. Mr. Bigelow purchased the abandoned loom, and on April 20, 1837, patented a new loom, the product of which matched perfectly.

A few years after producing the first successful ingrain power-loom Mr. Bigelow, with equal success, applied its principles to power-looms for the weaving of body and tapestry Brussels carpeting, of which only from three to four yards per day could be woven on the primitive hand-loom, while by the new power-loom a daily product of from eighteen to twenty yards soon became possible; and this quantity, by means of improvements by Mr. Bigelow and other inventors, has since been increased about threefold in the production of body Brussels and fourfold in the production of tapestry Brussels carpeting.

Mr. Bigelow perfected his ingrain loom in 1845, and his Brussels loom in 1848, and subsequently organized the Bigelow Carpet Company, which is now the most extensive producer of fine Wilton and body Brussels carpeting exclusively in the world. In 1851, John Crossley & Sons, whose mammoth carpet-mills are at Halifax, England, bought Mr. Bigelow's patent-rights for Great Britain, and nearly all British carpet-manufacturers now use the Bigelow power-looms and their modern attachments.

The Bigelow ingrain looms have been improved from time to time by other American inventors, for whose genius, as well as for that of foreign inventors, they formed an ample basis for operation. Among the more prominent improvements may be mentioned those found in the Babbitt, Murkland, and Duckworth ingrain looms respectively, the chief merit of these improvements, aside from rapidity of weaving, existing in shading attachments, with which, by means of skilfully arranged sliding and revolving shuttle-boxes, a great variety of shading may be introduced into the patterns of ingrain carpeting, the Duckworth ingrain loom being particularly conspicuous on account of its compactness and simplicity and its rapidity of weaving.

Improvements in the Bigelow Brussels and tapestry looms in America seem mainly to have been made by the late Ezekiel K. Davis, formerly the master mechanic of the carpet-mills of E. S. Higgins & Co. in New York City; the late John C. Duckworth, his successor; William B. Duckworth, the brother and successor of John C. Duckworth; and John Hill of Philadelphia. Mr. John C. Duckworth's body Brussels loom is a noteworthy combination and simplification of the Bigelow, Crossley, Mark Smith, and Wield improvements, with a few original attachments and changes. His tapestry loom, the main feature of which may be regarded as the actuating wire-motion, is also notable for its compactness and remarkable rapidity of weaving. The validity of the claim by the late Messrs. Davis and John C. Duckworth to having invented an improved actuating wire-motion for removing the wires from pile fabrics during the process of weaving has been contested at law during the past eleven years by the Webster Loom Company of New York, whose president, Mr. William Webster, avers it to be an infringement upon a similar invention of prior date of which he claims to be the originator. Mr. Hill's inprovement consisted of what is known as the "double-shed" movement, which consists of a mechanical combination by means of which the wires can be withdrawn and the threads simultaneously placed in the fabric, thereby obviating the necessity for forming an independent shed for the wire and two independent sheds for the threads, thus requiring only two revolutions of the crank-shaft for the completion of one loop or pile, instead of three revolutions, as had been previously required. Mr. Hill's invention was patented in 1847, and is still in popular use.

The American moquette power-loom is another product of native inventive genius which deserves special mention. This loom was invented in 1873 by Halcyon Skinner, then master mechanic for the Alexander Smith & Sons Carpet Company of Yonkers, N. Y., who also successfully invented the Smith Axminster power-loom in 1856. The original moquette loom has been from time to time improved by its inventor and his son, Charles E. Skinner, and it is protected by patents on both sides of the Atlantic. The Smith Carpet Company has 160 patent moquette looms in operation at Yonkers, and receives royalty on between fifty and sixty others which are run by the Hartford Carpet Company at Thompsonville, Conn., and on a large number which are used by foreign manufacturers.

The process of moquette-making is as simple as it is ingenious, and, stripped of its technicalities, it may be easily understood. The yarns which are to compose the tufts or cut pile of the fabric having been dyed of the desired colors (each yarn having only one color), are so wound on spools of the same length as the width of the carpeting that each yarn will be directly opposite to the point or place where it is to enter into the pattern. These spools are placed upon an endless chain in the order in which they are to be used, and have a spring at either end by means of which they are kept in position. When the loom is in motion the spools are automatically taken from the chain, and the yarns, guided by a series of small tin tubes, through which they are threaded, are seized by ingenious contrivances, and, having been carried down through the warp-threads, are bound in and turned up. A rotary knife or disk traversing the face of the fabric from side to side, and working against a stationary blade underneath, then cuts off the yarn, leaving the tuft in its permanent position, and by skilfully-arranged mechanism the spool is returned to the chain, which brings the next spool down to the level of the face of the fabric, and the process is repeated. When the fabric comes from the loom its surface is so nearly smooth that very little subsequent shearing is necessary to prepare it for market. The average productive capacity of these looms is about twenty-two yards each per day.

On July 9, 1881, Halcyon Skinner applied to the U. S. Patent Office for a patent for an improvement on his original invention, which has since been granted. Following is an abstract taken from the official description of this improvement obtained from the archives of the Patent Office at Washington, which will serve to illustrate the manner in which the tufts forming the pile of the moquette carpeting woven on these looms are fastened:

"*Brief.*—The warp is divided into sets of four

threads each, the outer threads of each set passing alternately over and under the shoots of back filling and binding them together in pairs. The middle threads pass alternately over and under a shoot of tufting-filling and the back filling on each side thereof. When additional tufting filling-threads are employed, the outer warps of each set may alternately pass over the same.

"*Claim.*—1. The new fabric consisting substantially of warp-threads and filling-threads combined as above set forth—that is to say, with the shoots of two back filling-threads and the warp-threads forming a practically continuous backing, upon and to which the upper filling-thread is bound by some of the warp-threads. 2. The new tufted fabric consisting substantially of warp-threads, filling-threads, and tufting material combined as above set forth—that is to say, with the shoots of two back filling-threads and the warp-threads forming a practically continuous web, upon and to which the tufting-filling and the tufts are bound by some of the warp-threads."

Since the last-mentioned patent was issued Charles E. Skinner has invented an improved moquette loom, which is claimed to be a more rapid loom, and to be capable of making a moquette fabric largely combining the best features of both Axminster and Wilton carpeting, but it is not yet in operation.

A new moquette loom, invented by George Crompton of Worcester, Mass., was publicly exhibited in Boston during the autumn of 1882. This loom differs materially from the Smith-Skinner loom, inasmuch as it cuts the pile with a wire similar to those used on Wilton looms, but uses only one cutting wire. It is said that the productive capacity of this loom is forty yards per day, but thus far only an exhibition loom has been constructed.

Two of the most valuable appliances of their kind invented in America are the Lyall positive-motion shuttle, and the Lyall cop, the inventions of Mr. James Lyall, one of the founders and the superintendent of the Chelsea jute-works in New York City, and a brother of one of the founders and proprietors of the Planet mills in Brooklyn, N. Y. By means of the positive-motion shuttle, which is automatically carried instead of being thrown or projected through the warp-threads, carpeting of practically unlimited width may be woven. The Lyall cop is a condensation of the yarn for insertion in the shuttle without the use of a spool.

Apropos of the power-loom, it is related that, despite the leading part taken by the city of Philadelphia in the great industry of carpet-making in America from its earliest history, and notwithstanding that its utility had several years previously been demonstrated elsewhere, it was not introduced into Philadelphia till 1849, when John Markley is said to have lost money by its introduction. A similar experiment subsequently made by James Lord is also said to have resulted unprofitably. In 1856, however, McCallum, Crease & Sloan were successfully running Babbitt ingrain power-looms at their Glen Echo mills.

The distinguishing characteristics of American carpet power-looms are their ingenious simplicity, lightness combined with strength, rapidity of weaving, compactness, and the fact that they are so constructed that they may easily be managed by girls and women, who constitute a large proportion of the weavers employed in the carpet-factories of the United States. Improvement in power-looms has caused a great diminution in the number of hand-looms, which are now rapidly becoming only relics of the olden time.

Progress in Quality and Style.—In no particular has progress in American carpet-making been more marked than in the improvement which has taken place both in the quality and style of the carpeting produced. Starting from the diminutive Axminster factory of William Peter Sprague in Philadelphia at the close of the Revolution, the weaving of Axminster carpeting is now carried on in various localities with hand- and power-looms of an aggregate capacity for annually producing about 250,000 yards of the various grades of this ancient and aristocratic floor-covering. In other kinds of cut-pile carpeting still greater progress has been attained. Moquette weaving, which has been carried on only a few years, now employs over 200 power-looms, with a capacity for producing about 1,200,000 yards per year, and is likely to become far more extensive in a very few years. Wilton carpeting is made on about 100 power-looms, capable of weaving an annual product of about 600,000 yards. Velvet carpeting, of which the production was virtually merely nominal only a year or two ago, has made a sudden bound into popularity and increased in rapid ratio, especially during the past year, there now being nearly 200 velvet power-looms in operation, capable of turning out an annual product of about 1,000,000 yards. Body and tapestry Brussels carpeting, representing the loop-pile fabrics, have also made wonderful strides both in quantity and quality. Body Brussels carpeting is said first to have been produced in America by Isaac Macauley at the old "Hamilton Mansion" on Bush Hill, Philadelphia, in 1815, though it has been popularly supposed first to have been woven in Thompsonville, Conn., in 1826, while by some it is averred that the first body Brussels carpeting woven in America was at Lowell, Mass., in 1829. With the passing remark that the Macauley claim seems to be fairly authentic, we will simply state that there are now in operation in various towns and cities in the United States about 600 body Brussels power-looms, with an annual productive capacity of about 7,500,000 yards. The manufacture of tapestry Brussels carpeting in America has been commonly supposed to have been begun by Joseph Crawshaw (now of St. Louis, Mo.) in 1848, at the old mill from which sprung the extensive factory of the Roxbury Carpet Company, in the suburbs of Boston; but there is also a statement that the first tapestry Brussels carpeting woven in America was produced, though unsuccessfully, at Newark, N. J., in 1846. The American tapestry mills now employ about 1050 power-looms, capable of producing about 13,500,000 yards of carpeting per annum.

Ingrain carpeting has also been greatly improved, especially in the methods of weaving, so that it is now produced in patterns similar to those found in the more expensive kinds of carpeting; and a great variety of shading, which could not be done by means of the old-fashioned hand-looms, has been attained by means of the power-loom and its modern attachments. The first ingrain factory at which harness-weaving in America is said to have been carried on was situated in 1820 on ground now occupied by the *Herald* building, at Broadway and Ann Street, in New York City. This factory was operated by John & Nicholas Haight & Co., who subsequently removed to Jersey City, N. J., and, after unsuccessful experimenting with a power-loom

which we have already mentioned, went out of business in 1838. There are now about 1500 power-looms and 3000 hand-looms employed in the weaving of ingrain carpeting of all kinds, with a productive capacity of nearly 30,000,000 yards per year. Damask, Venetian, and hemp carpeting, which may be classed under this general heading, have also made great progress, as we have already shown. The weaving of tapestry or "parti-colored" ingrain carpeting, however, which can be accomplished only by means of hand-looms, has become nearly obsolete, on account of the smaller cost at which a great variety of pattern and shading can now be attained by means of the improved power-looms. Tapestry ingrains, which were formerly made by several manufacturers in various places, and in considerable quantity, are now made only at the Sanford carpet-mills in Amsterdam, N. Y., where this product is very limited.

The manufacture of Turkey or Smyrna carpeting and rugs has also become an important feature of American carpet-making during the past three or four years. This branch of carpet-manufacture is almost wholly confined to the city of Philadelphia, where about 350 hand-looms turn out an annual product estimated to be worth about $1,500,000.

Rag carpeting, which has generally been largely ignored by statisticians, is produced in quantity sufficient to justify its recognition as a somewhat extensive factor in carpet-making in America, the aggregate product being estimated at about 1,500,000 yards, in which large quantities of new material from woollen- and cotton-mills and of shoddy yarns and other material are annually consumed.

A remarkable feature in the growth of carpet-making in America exists in the increase of the number of manufacturers who produce the finer grades of carpeting, which up to about 1870 were made at only a few mills, while now they are produced at many factories, and both supply and demand are steadily increasing.

Designing.—The art of designing carpet-patterns in America has fully kept pace with the great progress made in decorative art generally. During the past ten or twelve years especially there has been much attention given by American carpet-manufacturers to the production of artistic patterns. Formerly, the United States mainly relied upon England and France for designs, but the manufacturers now produce the greater part of the new styles in their own design departments. How much money is annually expended by American carpet-manufacturers for designing cannot be accurately estimated. It is, however, well known that several of the leading establishments annually expend fully $25,000 each in salaries to designers alone. On this basis it has been estimated that at least $250,000 per year is expended for salaries to designers, and that the total cost of maintaining the design departments is not less than $500,000. American styles of carpeting are remarkably varied and include every species of decoration. Natural floral styles and large figures in bright colors, which were formerly regarded as in a great degree distinctively American, have been extensively superseded by flat treatment with subdued color-effects, and the conventional styles which have been so long advocated by "high-art" devotees have been largely adopted by the general public, thus securing an admission from the critics that the tastes of the American people have improved, as well as the designs of the American carpet-manufacturers.

Consumption and Distribution.—Nearly all the annual product (63,000,000 yards) of the American carpet-mills (340 in number) is consumed in the United States. The population of the country being over 50,000,000, the average consumption *per capita* is about 1¼ yards, exclusive of oil-cloth and linoleum.

Some of the manufacturers sell and distribute the product of their own mills, for which purpose they keep an adequate force of travelling salesmen; others place the matter of sale and distribution in the hands of agents; while still others sell their goods outright to wholesale dealers known as jobbers, by whom they are in turn sold to and distributed among the retail dealers throughout the country. There are about 150 travelling salesmen regularly engaged in the sale of carpeting "on the road" in the United States. They make from two to four trips each per year, carrying an aggregate number of about 45,000 samples, valued at about $60,000 and weighing about 75,000 pounds. The total cost of selling carpeting by means of travellers is estimated at between $300,000 and $400,000 per annum. Much carpeting is also sold by local agents in cities.

The carpet-manufacturers and jobbers sustain an organization known as the Carpet Trade Association, which was inaugurated on Aug. 23, 1878, "for the protection and advancement of the business interests of its members." It is composed of leading manufacturers and jobbers of New York, Philadelphia, and Boston, and has its headquarters in the first-mentioned city. One of its principal features consists of a commercial-agency department, through which members may have credit investigations made to determine the degree of responsibility of dealers with whom they may have transactions or who may desire to open new accounts. There are in Philadelphia several associations among both the manufacturers and the mill-operatives, but their field of action is confined to that city alone, while that of the Carpet Trade Association is practically of national extent.

How Growth has been Promoted.—The great industry of carpet-making in America has been developed under the fostering care of national legislation, of which Alexander Hamilton struck the keynote in a report which he submitted to Congress in 1791, recommending its encouragement by increasing the import duty on carpeting from 5 to 7½ per cent. Subsequent legislation from time to time has increased the original duty several fold. The effect on imports is seen in the fact that while nearly 7,000,000 yards of carpeting were imported into the United States in 1870, the annual importation is now only about one-twentieth of that amount, the present quantity being about the same as that of 1833, fifty years ago, when only 344,114 yards were imported. In conclusion, it may fairly be said that no branch of textile manufacture has made greater progress during the past forty years, or is manifesting more vitality and enterprise, than carpet-making in America. (W. A. H.)

CARRIAGES. Two circumstances have combined to give the art of carriage-making in the United States a peculiar and original character. The ease with which patents may be secured has stimulated invention, and the climate is favorable to the growth of excellent carriage-materials. The great extent of the country, the general wealth of the people, and the geology of the continent have also done much to give the art its present position. The distances between towns and the great area of the cities has created an enormous demand for vehicles to be used in the internal commerce of the country, while the prosperity of the people has

See Vol. V. p. 48 Am. ed. (p. 134 Edin. ed.).

encouraged a desire for pleasure-carriages. The geology of a country affects the character of its roads, and these in turn decide the character of the carriages used upon them.

The most striking feature of American carriages is their lightness. This springs partly from the character of the woods employed and partly from the designs of the body and running-gear. The aim appears to be to employ the light and strong woods to the best advantage, and to reduce the power needed to move a given load. The inferior character of the roads, which are generally soft or sandy, has also led to the use of carriages that are light and yet strong. Different parts of the country have demanded different kinds and styles of vehicle to suit the character of the roads, and this has led to the invention of new forms of carriages, such as the buckboard, the mountain-wagon, the buggy, and many other varieties more or less related to them. While the conventional European styles of carriages have been closely copied in a few of the larger cities, the general tendency appears to be to modify those styles and to adapt them more nearly to American wants. The purely American types of carriages are likewise subject to endless variations, each of the great manufacturing centres producing novel forms or modifications and combinations of old styles every season. Every part of the vehicle and every tool used in its manufacture has been the subject of improvement, and a vast number of patents have been issued covering these changes. Some of these patents have proved of the greatest value to the art and to their owners, but the majority appear to be unimportant. The result, in the main, has been of benefit, as it has tended to cheapen production and improve the character of the work. Many of the more valuable patents have now become public property. In the large cities the cost of fine carriages has remained unchanged for many years. Throughout the country the average cost appears to have steadily declined. This has proved of great benefit to the trade, and has been accomplished in part by the general introduction of machinery, the division of labor, and the division of production. This last is perhaps the most striking feature of the art of carriage-making in America.

Manufacture.—The general plan upon which the manufacture is now conducted implies the subdivision of labor and the minute division of the business into small branches. each one having to do with the production of only a small part of a single carriage. One manufacturer may produce only wheels, or perhaps only spokes, hubs, or rims. Spring-making, body-making, shaft- and bow-making, or the manufacture of dash-boards, lamps, irons, or gears, may be a separate and distinct business. The carriage-materials—wood, iron, cloth, leather, etc.—and these parts of carriages are distributed from several great centres to the carriage-makers, who assemble the parts, trim, paint, varnish, and finish the vehicles. These are properly manufacturers of carriages. In only a few instances are all or nearly all the parts made in one shop from the raw material. In such places the finest and most expensive carriages are made, and these makers of single vehicles are probably at the head of the art. Where a single carriage is specially designed for a purchaser it becomes more nearly a work of art. This work demands artistic skill, and is rightly distinguished from manufacture, where carriages are produced in large quantities, all exactly alike. Besides the carriage-makers and manufacturers, there are also carriage-repairers. While making repairs their chief aim, these shops occasionally assemble the parts and make new carriages. Strictly speaking, the carriage-makers are the artisans who design carriages and assemble the parts, more or less of which they may purchase of others, and who sell them at wholesale or retail. The makers of parts of carriages are engaged simply in what may be called "accessory trades." There are also dealers in carriages who are simply merchants.

The making of carriages is naturally divided into four parts or stages of work. The first of these is body-making or wood-working; secondly, blacksmith-work, or reinforcing the wood-work with iron and steel; then follows the trimming or fitting up the top, seats, curtains, etc., which is practically upholstering; and lastly, the painting, decorating, and varnishing. The workmen are likewise classed as body-makers, blacksmiths, trimmers, and painters. These divisions of work mark the divisions of the accessory trades. These may be broadly divided into spring-makers, axle-makers, hub-, spoke-, and rim-makers, wheel-makers, manufacturers of trimmings, cloths, leathers, parts of iron-work or hardware, makers of bodies, and makers of paints and varnishes. Some of these are in turn subdivided into smaller trades. As an instance, the makers of lamps, dash-boards, neck-yokes, etc. may be classed as makers of trimmings. Wheel-making is divided into spoke-, rim-, and hub-making. These accessory trades, while widely distributed over the country, are in a few instances concentrated in single towns, the making of carriage hardware and trimmings being, for instance, concentrated at Newark, N. J., and the distribution of materials of all kinds at Philadelphia. Carriage-making is in the same way concentrated at a few great cities, some of these being in turn closely connected with other places, which serve, as it were, for workshops. New York, Philadelphia, Boston, and Cincinnati are great centres for the manufacture and sale of carriages, New York being supplemented by New Haven, Conn.; Philadelphia, by Wilmington, Del.; and Boston, by Amesbury. In Cincinnati the sale and manufacture are united, and at Amesbury, Mass., carriage-making is the leading interest of the town.

Construction.—The use to which the vehicle is to be put is practically decided by three considerations—the load, the power, and the road. When the use is known, the carriage-maker's first step is to elaborate the design. Designing carriages is an art demanding a thorough knowledge of mechanics, the strength of materials, the laws governing moving loads, and a good sense of artistic form. A lively appreciation of points requisite for the physical comfort of both man and beast is also needed. Carriage-designing is an art very largely controlled by precedent and fashion. It is more conservative than any other branch of the general art of design, yet it offers a good field for real talent and invention. While it is hampered by fashion, that places an unreasoning and unreasonable value on European patterns, the art of carriage-design is clearly improving and becoming more characteristic of the country and the times. There is an excellent school of carriage-designing in New York, and the technical journals frequently publish new and valuable patterns for the use of the trade. The design for the proposed carriage having been carefully drawn to scale, it is sent to the shop for the guidance of the actual workmen. Here comes the marked distinction between carriage-making or building and carriage-manufacture. In the manufactory a hundred vehicles of this design may be made at once. If it is a four-wheeled top buggy for a single horse, 200 pairs of wheels or parts of wheels, 100 bodies, 100 pairs of springs, 100 shafts, 100 seats, tops, dash-boards, etc., must be made or bought, and the whole work consists in assembling these parts into one hundred vehicles, all exactly alike. At the carriage-builder's one only of each part or pair of parts is needed, and these may be bought or made and put together to form a single vehicle.

Body-Making.—The materials used in making the bodies of carriages are chiefly ash, oak, hickory, and white wood. Iron must also be used, but practically the art of body-making is wood-working. Whatever the shape of the body, be it a mere box, as in an open buggy, or the most elaborate form of coach, phaeton, or coupé, the work is essentially the same. The frame or heavy portions of the body are of ash or oak, and the sides or panels and top are of white wood. Basket-work or woven willow or rattan is sometimes used for panels. In manufactories where a number of carriages of one pattern are made, the various parts to form the frame, sides, seat, top, etc., are got out in large quantities by machinery, all the parts being interchangeable. In making fine carriages, where only a few of a kind are made at once, much of this work is done by hand, the frames being cut out of solid lumber and the ornamental portions carefully carved. The work demands the very highest skill of the wood-worker, and may be not unjustly regarded as a fine art.

Wheel-Making.—The making of hubs, spokes, and rims and whole wooden wheels is a branch of manufacture often quite distinct from carriage-making. The materials of wooden wheels are for spokes for heavy wagons oak, and for carriage-wheels hickory. Hubs are made of elm and gum, and rims of oak. In making spokes the rough sticks are cut to length and then placed in a spoke-lathe. The lathe used is a modification of the last-lathe, and is automatic in its action, the cutters following an iron pattern placed in the machine and forming every spoke exactly like the pattern used. These patterns are of cast iron, and very carefully copied from wooden models made by hand. The grinding and polishing of the spokes are done upon machines constructed for the purpose. Bands of canvas covered with sand or corundum are used in polishing the spokes. Hubs are sawn out in lengths from the round sticks, and are always turned upon a lathe by hand. Rims are got out by machinery from the log into lengths suitable for making half a wheel. After steaming they are put in a bending-machine and bent while hot into a half circle. They are taken from the machine in a former that retains them in shape. When cold and dry they keep their shape, and are ready to be formed into wheels. This steaming and bending give a rim with an unbroken grain, and leave the wood in a curved shape, but unharmed and quite as strong as when straight. Bows for forming the tops of carriages and curved shafts are bent in the same way. The assembling of these parts and the putting on the tire is the work of the wheelwright. In some factories the rims, hubs, and spokes are put together, and they are sold as wooden wheels to the carriage-makers, who put on the tires, paint, and finish them. In some of the larger carriage-works only the parts of wheels are bought, and in a few instances the wheels are made entire from the lumber in the carriage-shop.

A number of patents have been taken out on various methods of reinforcing the wooden hubs of wheels with iron. Some of these patent hubs have proved of great value, and have been widely adopted by the trade. The main idea underlying all the different patents is to apply metal rings to the hub to clasp or enclose in various ways the ends of the spokes inserted in the hubs. While these patent wheels are strong and durable, and of the greatest value in wagons and in all vehicles used on rough roads, they are not adapted to the finer class of vehicles used on pavements. They are strong, but inelastic, and the reinforcement of the hub only transfers the weak point of the wheel from the hub to the rim. In wagon-making the patent wheels are very largely employed, as the want of elasticity is not important.

Blacksmith-Work.—The blacksmith's shop is the most important part of every carriage-factory. The number of forge-fires makes a standard of comparison between shops—the more fires the greater the establishment. In this department of carriage-construction there is more opportunity for manual skill than in any other. While all the best iron-making tools that can be used in a forge are used in carriage iron-work, the art is, and must be, one of individual skill. Drop forgings and malleable-iron castings are very largely used in manufacturing carriage iron-work. Screws, bolts, clips, steps, rods, and other small parts are largely made in special shops, and under the name of carriage hardware enter into the work of every carriage-factory. At the same time, these parts must be forged to other parts or fitted to the wood-work they are intended to to reinforce, and this work must always be done by hand. All carriage-bodies, even of the most simple pattern, must be reinforced with iron, and this work must be done at the forge, each piece of iron being made and fitted to its special place and use. In the case of coach-bodies the wood-work is never sufficiently strong to sustain its load unaided, and the main frame must always be backed by heavy wrought-iron work. This work, together with putting the gears or running portion, the springs or suspension system, together, makes the work of the carriage-blacksmith.

The making of springs of all kinds is a branch of work quite distinct from carriage-making, none of the carriage-builders making their own springs. The material for springs is always steel, and the forms commonly used are the C-spring and various modifications of the elliptic spring. Wood is also largely used in the United States as a material for springs. This is shown in the side-bar vehicles and the buckboard. The side bar and the elastic board are not regarded as actual springs, yet in practice they are so used, and for this reason wood may fairly be said to be a material for springs.

The Trimming-Shop.—In this department of work machinery has been very largely used to produce the smaller parts—nails, tacks, buckles, laces, yokes, etc.—and the manufacture of what is called carriage trimmings has become a separate branch of business. The materials used in trimming carriages are leather, rubber, metals, and cloth. The art of carriage-trimming consists in fitting the top or hood; upholstering the seats; covering the wooden and iron portions of the tops with leather, rubber, and cloth; making the dash-boards, lamps, whip-sockets, cushions; and, in short, decorating and finishing the interior and all the parts not painted or varnished. There is field in this work for the display of considerable artistic skill, and in this respect the work of American shops appears to be fully equal to anything seen in Europe. At the same time, American carriage trimmings and fittings show a greater variety and more freedom in decoration, with vastly more conveniences, than English or French work of the same class. Nickel- and silver-plating is much used in American trimming to protect metallic surfaces exposed to much wear.

The last step in carriage-making is the painting and varnishing. The manufacture of paints and varnishes has been carried to a very high degree of perfection, and is everywhere a distinct branch of work from carriage-making. The prevailing colors used in painting carriages are black, dark green, and dark blue, and sometimes bright shades of red.

Kinds of Carriages.—The art of carriage-building grew out of the art of coach-making, and was of European origin. For this reason the principal types of carriage forms are European. The essentially European vehicles are the coach, clarence, landau, coupé, phaeton, chaise, and all those more or less related to these. The American forms are the rockaway, the buckboard, the sulky, and the American buggy. While only four, or if the mountain-wagon be included only five, distinct forms of carriages have originated in the United States, it must be observed that all the European types have been made and used in this country, and every foreign type has been made the subject of many modifications. So much has this been done that there is very great confusion of names in the styles. In many instances the names have been compounded in the effort to express rather shadowy differences of form.

Of the four American types of carriage, the rockaway is a two-seated vehicle with a fixed top, and probably grew up from a simple wagon over which a canopy was spread. The buggy is a single-seated four-wheel vehicle with or without a top, the two pairs of wheels being very nearly of the same size. It naturally sprang

from a desire for a light vehicle suitable to rough roads in a new country. It also met the desire for a light vehicle for speed. The American sulky for racing purposes has been thought to be related to the single-seated vehicle known as the désobligeante. The name might suggest this, yet it is clearly an American invention. The buckboard is a four-wheeled vehicle without gearing or springs. A long elastic board is bolted directly to two pairs of wheels. A seat is placed in the middle, the elastic board serving at once for gear, springs, and body. It has become very popular in mountainous pleasure-resorts. The mountain-wagon is an open wagon with three or four seats, and is becoming popular as a pleasure-wagon for large parties. In none of the American types of carriages is there any provision for a separate seat for the driver. In this respect they are essentially democratic, and sharply marked from the majority of European types, where the driver always occupies an inferior position in the vehicle.

The types of carriages introduced into this country under the name of village carts, T carts, and dog carts are all of English origin, but have been adopted here, and both changed and improved in design and construction.

The system of suspension known as the side bar is of American invention. In side-bar vehicles the body is suspended by means of springs between two bars of wood supported by the axles, and forming a square solid frame or gearing. The side bars are elastic and serve as springs. The side-bar system is largely used in the lighter classes of buggies and two-seated wagons, both with and without tops.

Statistics of Carriage Production.—In 1882 there were in the United States 16,875 carriage-builders and repairers, including sleigh- and wagon-makers. There were also in that year 2092 individuals and firms in the accessory trades. The carriage-making interest is represented by one or more shops in every State and Territory except Arizona and Idaho. The following are the leading centres of the trade, arranged in the order of the number of establishments in each: New York, 139; Philadelphia, 110; Brooklyn, San Francisco, Cincinnati, Providence, Chicago, St. Louis, Baltimore, Louisville, Washington, and Cleveland, 25 each; and Boston, Buffalo, and Detroit, 23 each. Other places have a less number, and very few towns or villages are so small that at least one carriage-repairer cannot be found. Amesbury, Mass., is an important centre, because carriage-making is almost the only interest. The product of this town in 1881 was 18,000 carriages. In the twenty leading centres of the carriage-trade $9,910,416 is invested in capital, and employment is given to 11,815 men and 1000 women and children. The distribution of the capital and labor does not follow the number of establishments. Cincinnati, with only 50 shops, employs 2694 men, while Philadelphia, with 110 shops, employs only 1562. This shows that the size of the establishments is larger, there being twice as many men in one shop in Ohio as in a shop in Pennsylvania. The total wages paid in twenty leading cities amounted in 1881 to $5,513,258; the cost of the materials consumed reached $9,005,707; and the total product was valued at $19,448,318. The cost of materials used in making carriages in the whole United States reached $28,738,498. The finished product was valued at $56,254,718. In carriage- and wagon-materials 332 establishments, with a capital of $6,131,485, gave employment to 6677 persons; the wages paid in 1881 amounted to $2,230,408; the materials cost $4,016,200; and the product was valued at $8,403,411. (C. B.)

CARRIER, COMMON, one who holds himself out to the public as ready to carry for hire from place to place the goods of such persons as choose to employ him. The general principles of the common law relating to the duties and responsibilities of common carriers are the same in the United States as in England, and in many of the States statutes have been enacted defining more particularly their duties and their liability to the public who employ them. As communication by railroad has been greatly extended, and inter-communication in trade between the different States thereby largely increased, this branch of the law has become of great importance, and a singular unanimity is found in the decisions of the courts of the different States, based upon the general principle of the common law derived from England, and originally found in the civil law, that the contract of a carrier of goods is one of indemnity. Some difference has existed between the law in England and in this country as to the extent of the liability of a common carrier who receives goods to be sent to a destination beyond his own route, and delivers them to another carrier to be taken there; but in this country, where, by reason of the great distances of shipment by land and by water, and the necessity of using therefor more than one line of railway or of water-transportation, this is generally made the subject of a special contract to which the shipper of the goods becomes a party, and the responsibility of the carrier must in such case be measured by the express terms of the contract. The best text-books on this subject are the books of Redfield and of Angell *On Carriers*. (S. W.)

See Vol. V. p. 122 Am. ed. (p. 138 Edin. ed.).

CARRIERE, MORITZ, a German philosophical and æsthetical writer, was born at Griedel, in Hesse, March 5, 1817. He studied philosophy at Giessen, Göttingen, and Berlin, and then spent some years in Italy in the study of art. In 1842 he became a lecturer on philosophy at Giessen, and in 1849 he was made professor there. In 1853 he was called to the University of Munich, where he gave special attention to æsthetics. He also lectured in the Art Academy on the history of the fine arts. One of his earliest publications was *Die Religion in ihrem Begriff* (1841); he afterwards translated the letters of Abelard and Héloise and added a sketch of their lives. In his work on *Die philosophische Weltanschauung der Reformationszeit* (1847) he traced the course of philosophy from the schoolmen to Descartes, giving original views of Giordano Bruno and Jacob Böhme. His *Religiöse Reden und Betrachtungen für das Deutsche Volk* (1850) is a defence of revelation against pantheism and deism. His treatise on *Das Wesen und die Formen der Poesie* (1854) was the forerunner of his *Aesthetik* (1857; 2d ed. 1873). In his illustrated work on art, *Die Kunst im Zusammenhang der Kulturentwickelung und die Ideale der Menschheit* (5 vols., 1863–73; 3d ed. 1877–80) he endeavors to combine philosophic insight with historical truth. His views of moral philosophy are set forth in *Die sittliche Weltordnung* (1877). He edited Goethe's *Faust* (1869) and Schiller's *Wilhelm Tell* (1871), and has published some poems, among which are *Die letzte Nacht der Girondisten* (1849) and *Agnes: Liebeslieder und Gedankendichtungen* (1883). He took a prominent part in opposition to Ultramontanism.

CARROLL OF CARROLLTON, CHARLES (1737–1832), an American statesman, was born at Annapolis, Maryland, Sept. 20, 1737. O'Hart, in his *Irish Pedigrees*, traces the family to an early king of Munster, and asserts that the more recent ancestors were called princes or barons of Ely, from an estate in Leinster. In 1688, Charles Carroll, who had been secretary to Lord Powis, came to America, and, settling at Annapolis, became the agent of Lord Baltimore, the proprietary of Maryland. He obtained several large grants of land, one of

which, on the Patapsco River, was called Ely O'Carroll. His business capacity and prudent management enabled him to retain his position as agent of the proprietary for thirty years, and his talent seems to have been inherited by his descendants. His son Charles, born at Annapolis in 1702, succeeded to his rich estates and married Elizabeth Brooke. Charles, their son and only child, afterwards called "of Carrollton," was sent to France in 1745, and was educated at the college of the English Jesuits at St. Omer, France, at the French Jesuit college at Rheims, and at the college of Louis le Grand in Paris. He studied law in Bourges, Paris, and London, returned to America in 1764, and married Mary Darnell in 1768. His vast estates rendered him at the outbreak of the Revolution the richest man in the colonies, yet he was ever an ardent friend of liberty. As early as 1770 he had protested on behalf of the people against an arbitrary attempt of the royal governor to impose taxes. Under the name of the "First Citizen" he carried on a vigorous controversy with Daniel Dulany, the secretary of the province, who wrote under the signature of "Antilon," and had a high reputation for ability and eloquence. In 1773 the protest against taxes imposed without the consent of the representatives of the people took a wider range when the British government, in the interest of the East India Company, attempted to overcome the refusal of several American colonies to receive tea on which duties had been levied. In October a brig arrived at Annapolis with a cargo of the obnoxious article. The leading citizens showed such determined spirit of opposition that the consignee, following the advice of Mr. Carroll, allowed the vessel to be burned to the water's edge. The opposition to the policy of the British ministry increased to such an extent that on Dec. 8, 1774, a State convention was held, and Charles Carroll, triumphing over the prejudice which had long disfranchised Roman Catholics in the colony founded by one of that faith, sat as a member of this body. About this time he assumed the designation "of Carrollton," from the family estate in Frederick county, to distinguish him from another member, Charles Carroll, barrister, also born in Annapolis. In 1775 he was chosen a member of the first committee of observation established at Annapolis, and a delegate to the provincial congress. In February, 1776, the Continental Congress appointed Dr. Benjamin Franklin, Charles Carroll, and Samuel Chase commissioners to visit Canada for the purpose of securing the assistance of the people there in the struggle for independence. Rev. John (afterwards Archbishop) Carroll also went with them by special invitation. A journal of this unsuccessful mission, with a memoir by B. Mayer, was published in 1845. On his return, in June, 1776, Mr. Carroll found the delegates from Maryland embarrassed on account of instructions given by the legislature "to disavow in the most solemn manner all design in the colonies of independence." He hastened to Annapolis, secured the repeal of these instructions, and on July 4 was himself elected delegate. On Aug. 2, when the Declaration of Independence was formally signed by the members of Congress, he was one of the first to attach his name. The story that he then first used the addition "of Carrollton" is incorrect. He was afterwards one of the committee that prepared the constitution of Maryland, and was several times a member of the State senate. In 1777 he was again a delegate to Congress, and in 1788 was elected to the United States Senate, where he acted with the Federalists in the political struggle. He vacated his seat in 1791, and was again chosen to the State senate. In 1799 he was one of the commissioners to fix the boundary between Maryland and Virginia. In 1801 he retired from public life, and spent his time in the management of his estate. The death of Thomas Jefferson and John Adams on July 4, 1826, left Charles Carroll of Carrollton the only surviving signer of the Declaration of Independence. In the funeral ceremonies held in memory of them in Baltimore, as in all the leading cities, Mr. Carroll was the chief mourner. On July 4, 1828, being then in his ninety-first year, he inaugurated the Baltimore and Ohio Railroad amid imposing ceremonies, which included a procession representing all the trades. This was his last public appearance; his strength gradually declined, and he died peacefully in the home of his daughter at Baltimore, Nov. 14, 1832. Throughout his life he was noted for his dignified manners, unfailing courtesy, and regard for the rights of others. His only son, Charles, married Harriet, daughter of Hon. Benjamin Chew, chief-justice of Pennsylvania. One of the daughters, Catharine, was married to Robert Goodloe Harper, a distinguished Maryland Federalist and advocate of the colonization movement. The other daughter, Mary, was married to Richard Caton of Maryland, and her four daughters were noted for their beauty. Three of them were married to English noblemen, and were known at the court of George IV. as "The American Graces." When the marquis of Wellesley, to whom the eldest was married, became lord lieutenant of Ireland, Bishop England of Charleston, S. C., gracefully referred to the fact, as well as to her beauty, by proposing as a toast on one occasion, "Charles Carroll of Carrollton: in the land from which his father's father fled in fear his daughter's daughter reigns a queen." The fourth daughter, Emily, was married to Mr. John McTavish, a gentleman of Scotch descent and for a long time British consul at Baltimore. The family retains its social prominence in Maryland, and when the Centennial anniversary of American Independence was celebrated, Hon. John Lee Carroll, great-grandson of Charles Carroll of Carrollton, as governor of Maryland took a prominent part in the ceremonies at Philadelphia on July 4, 1876.

CARROLL, JOHN (1735–1815), the first bishop and archbishop of Baltimore, primate of the American Catholic Church, was born at Upper Marlboro', Md., Jan. 8, 1735. He was the third son of Daniel Carroll and first cousin of Charles Carroll of Carrollton. After a short attendance at a grammar-school he was sent to the college of St. Omer in France, where he distinguished himself by his intellectual gifts, his attention to his studies, and the sweetness of his disposition. After passing successfully through the usual course then taught at St. Omer, he was transferred to the Jesuit college at Liége, where he devoted himself to the higher branches of literature and science. Here he formed the resolution of embracing the ecclesiastic state in the Society of Jesus. He was ordained in 1769, having resigned in favor of his brother and sisters the estate bequeathed to him by his father. After his ordination he taught the higher classes at St. Omer and Liége until 1773, when the Society of Jesus was suppressed. After that event Father Carroll was induced by Lord Stourton, a Catholic nobleman of England, to accompany his son on a Continental tour. Upon his return to England he accepted an invitation from the earl of Arundel to reside in his family as private chaplain. He remained at

Wardour Castle a year or two, when his love of country induced him to return to his home, which was then on the eve of the struggle for independence. He engaged in missionary duties in Montgomery co., Md., where his mother, brother, and youngest sisters resided. He also extended his labors to Stafford co., Va., where two married sisters lived. In 1776 he was called away from his parochial duties to accompany Dr. Franklin, Samuel Chase, and Charles Carroll, the commissioners appointed by Congress to visit Canada in order to secure the co-operation of that country in our struggle for independence.

At the close of the Revolution the American Catholic clergy, wishing to establish a hierarchy of their Church independent of England, applied to the pope for the appointment of a vicar apostolic for the Catholic Church in the United States, at the same time nominating and recommending Father Carroll for the position. In June, 1784, he received the appointment, and removed to Baltimore. At that time there were 16,000 Catholics in Maryland, 7000 in Pennsylvania, and 1500 scattered through the other States. There was not a single bishop in the United States, and only fourteen priests; in less than a century the Catholic population has increased to about 9,000,000, with one cardinal, fourteen archbishops, sixty bishops, and nearly five thousand priests.

In 1789, Dr. Carroll was appointed the first bishop of the United States, with his see at Baltimore. Early in the summer of 1790 he sailed for England, and was consecrated by Bishop Walmsley, the senior vicar apostolic of the Catholic Church in England, on the 15th of August of the same year, in the chapel of Lulworth Castle, the seat of his old friend Thomas Weld, Esq. Within a month after his consecration he left England, anxious to engage in the active duties of his immense diocese, which embraced the whole of the then United States. In 1791 he founded Georgetown College, D. C., which was the first Catholic college established in this country. Bishop Carroll won the respect and admiration of all classes and religious sects by his learning, gentleness, and Christian charity. When Washington died he was invited by Congress and the clergy of all denominations in the United States to deliver a panegyric on the Father of his Country, and on the 22d of Feb., 1800, he complied with the request; and of all the many discourses called forth by that melancholy event there was none more eloquent than that of the accomplished bishop of Baltimore. The corner-stone of the handsome cathedral of Baltimore was laid by Bishop Carroll on the 7th of July, 1805, but the church was not finished until nearly forty years after. On the 8th of April, 1808, Dr. Carroll was elevated to the dignity of archbishop, and four other sees were created—viz. New York, Philadelphia, Boston, and Bardstown, Ky. Archbishop Carroll continued to watch over the Church with unabated zeal until his death, on the 3d of Dec., 1815, in the eightieth year of his age.

(E. L. D.)

CARROLLTON, the county seat of Greene co., Ill., is 65 miles N. of St. Louis, on the Kansas City branch of the Chicago and Alton Railroad. A railroad from Litchfield, 40 miles E., is also projected to pass through the city. It has three hotels, a national bank, two other banks, three weekly newspapers, six churches, two schools, and a park. Its industries comprise a foundry, a carriage-factory, and four flour-mills. It was settled in 1835, and incorporated as a city in 1868. It is free from debt; its yearly expenses are $5000. The population, mostly of Southern origin, numbers 1934.

CARROLLTON, the county-seat of Carroll co., Mo., is on the Wabash, St. Louis, and Pacific Railroad, 209 miles N. W. of St. Louis and 66 miles E. of Kansas City. It has two hotels, two banks, a fine court-house, a public library, three weekly newspapers, eleven churches, a convent, and good schools with a commodious building, a woollen-mill, and other manufactures. It was laid out in 1833, incorporated in 1847, and in 1871 chartered as a city. Population, 2313.

CARROT. This well-known plant belongs to the natural order *Umbelliferæ*, and is the *Daucus Carota* of Linnæus. It was formerly associated with *Pastinaca*, under which name its ancient history is to be sought. The exact origin of the carrot has never been ascertained, though the belief is general that the ordinary wild carrot is its parent, and this, therefore, has received the name of *Daucus Carota*. So far as it has been recorded, however, all attempts to produce from the wild plant roots similar to those cultivated have failed. No details of the manner of experimenting have been given. It appears from a note by Dr. Salmon in his *Herbal* that the plant can be made to change some of its character by art. His book was published in 1705. He remarks: "In Carolina I saw a carrot above four years old, which brought forth its ripe seed in the fifth year: the reason thereof I conceive to be, because the master of the house cut off every year its green tips (flower-stalks) that it might not seed, whereby the root grew very great, as also the green head the fifth year; which was four or five times as big as any ordinary carrot head. This head he let stand for seed, and it produced him an incredible quantity thereof, very fair and twice the size of ordinary carrot-seed." No improvement is, however, recorded anywhere. Though the wild plant is a native of Britain, the cultivated form appears not to have been known till introduced from Holland about 1558. The wild carrot is a native also of Greece, where are five other species. America has one species, *Daucus pusillus* of Michaux, a native of the Gulf States, but of no value so far as known; indeed, the common carrot is known as a weed on slovenly farms or as a wild plant in uncultivated places.

See Vol. I. p. 328 Am. ed. (p. 369 Edin. ed.).

The umbel of flowers is white, but there is generally one crimson flower in the central umbellet; and it is interesting as showing how circumstances modify plant-behavior to note that, while European authors record this flower as fertile, in America it is only in the first umbel of flowers of the season that the crimson flower in the central umbellet perfects seed.

Carrots contain a large proportion of sugar, and some have believed that spirits could profitably be distilled from them. An analysis shows the root to contain of water, 87·5; albumen and casein, 0·6; sugar, 6·4; fat, 1·2; gum, 1·0; woody fibre, 3·3; mineral matter, 1·0. Experiments in England gave from 42 bushels of carrots 50 gallons of spirits, which yielded 12 gallons of rectified spirits.

For cattle-feeding carrots have proved excellent, especially for horses. Horses which have had 10 pounds of oats per day have been found to do just as well on 2 pounds of oats and 5 pounds of carrots; and 250 pounds of carrots have been found equal to 100 pounds of meadow hay. Even the mole is fond of sweet things, and pieces of carrot have been found excellent baits in mole-traps. It is said that 830 bushels, or 20 tons to the acre, have been raised in Maine; 700 bushels is the heaviest crop that appears to be on record in England.

(T. M.)

CARSON, CHRISTOPHER (1809–1868), commonly called "Kit Carson," a Western hunter and soldier, was born in Madison co., Ky., Dec. 24, 1809. While he was an infant his family removed to Missouri. At the age of fifteen he was apprenticed to a saddler, but two years later he joined an overland trading expedition to Santa Fé. Attracted by the freedom of life on the Plains, he became a trapper and roamed over the country between the Rocky Mountains and the Pacific. He became expert in all that pertains to the hunter's life, and surpassed the Indians in fertility of resource and keenness of observation. For sixteen years his rifle furnished nearly every particle of food on which he lived. In 1831, Messrs. Bent and St. Vrain, the proprietors of an Indian trading-post, engaged him to supply their fort with provisions and furs. Gradually the report of his romantic adventures gave him a wide reputation. In 1842, after the death of his Indian wife, he brought his daughter to St. Louis to be educated. Here Lieut. John C. Fremont was preparing his first expedition to explore the Rocky Mountains, and was glad to secure the services of the famous hunter. The expedition lasted from June to September, and in it Fremont discovered and ascended the peak which bears his name. In 1843, Carson returned to New Mexico, married a Spanish lady, and resumed hunting and trapping for his former employers. Accidentally meeting Fremont on his second expedition, Carson joined the company, and continued with him during the military operations which resulted in the conquest of California in 1846–47. Carson was then sent with despatches to Washington, and while in the East was nominated by Pres. Polk as a lieutenant in the U. S. rifles, but the Senate in the following January rejected him. He now settled down in New Mexico, and in 1853, on account of the demand for sheep in California, gathered a flock of 5000, drove them over the mountains, and sold them at a high price. This visit to California again attracted public attention to his name, and when he returned to New Mexico he found that he had been appointed by the general Government Indian agent for that district. By his knowledge of Indian character, his fidelity to his engagements, and the universal respect in which he was held by the tribes he succeeded in negotiating several important treaties. When the Civil War broke out he remained faithful to the Union and rendered signal service to the cause. He was made colonel of the First cavalry of New Mexico, and was brevetted brigadier-general for meritorious conduct during the war. At its close he resumed his duties as Indian agent. In the early part of 1868 he visited Washington with a deputation of Indians, and made a tour of the Northern and Eastern States. He was as modest as he was brave, and shrank from public notice. Just after his return to the West he died at Fort Lyon, Col., May 23, 1868.

CARSON CITY, the capital of the State of Nevada, is a city of Ormsby county, on the eastern side of the Sierra Nevada, 16 miles S. of Virginia City, on the Virginia and Truckee Railroad. Besides the State Capitol, it contains the United States mint, six hotels, two banks, four daily newspapers, four churches, three schools, and an orphans' home. It was settled at 1857 and incorporated in 1876. Its property is valued in $2,000,000; its public debt is $63,000, and its expenses for 1881 were $10,638. It is surrounded by grand mountain-scenery, is lighted with gas, and furnished with water-works. Its prosperity is due to the gold- and silver-mines of the vicinity; there are in the city five quartz-mills, also the railroad car-shops and office, a foundry, and a soap-factory. Population, 4229.

CARTERSVILLE, the county-seat of Bartow co., Ga., is 49 miles N. W. of Atlanta and 90 miles S. of Chattanooga, on the Western and Atlantic Railroad, and is the terminus of the Cherokee Railroad. The latter, now completed to Cedartown, Ga., is to be extended to Birmingham, Ala., through the coal-fields of that State. Two other railroads are projected—one to Gainesville, Ga., and the other to Maryville, Tenn. The latter will pass through a country rich in iron ore and manganese. Cartersville has a fine court-house, opera-house, a bank, three hotels, two weekly newspapers, seven churches (three for colored people), and seven schools. Its industries comprise the Georgia Car Company's works, a foundry, baryta-mills, and a large carriage-factory. It carries on a large trade in lumber, iron, and cotton. Its property is valued at $750,000, and its yearly expenses are $5500. Population, 2037.

CARTHAGE, the county-seat of Jasper co., Mo., is half a mile south of Spring River, 10 miles east of the Kansas boundary, and 150 miles south of Kansas City, on the St. Louis and San Francisco Railroad and on the Missouri Pacific Railroad. It has a fine courthouse, seven hotels, four banks, two daily and four weekly newspapers, a public library, nine churches, and a handsome school-building with eighteen departments. The industries of the town comprise a woollen-mill, a saw-mill, four flour-mills, a foundry, three marble-works, and manufactures of carriages, wagons, ploughs, furniture, barrels, and cigars. Carthage was first settled in 1841, but during the Civil War was entirely destroyed. It was rebuilt in 1866, and incorporated in 1873. Its property is now valued at $1,125,000, and its public debt is $9000. In 1881 the public expenses were $12,400. It has two parks, gas- and water-works. The surrounding country is favorable for agriculture, and there are twenty flour-mills in the vicinity. There are also limestone quarries and zinc- and coal-mines. The population, chiefly of Northern birth, in 1880 numbered 4176.

Near the town a battle was fought July 5, 1861, between Federal troops, numbering about 1500, under Maj.-Gen. Franz Sigel, and the Missouri State troops, 5000 strong, commanded by Gens. Parsons and Rains, under the general orders of Gov. Jackson of Missouri. These latter were supposed to be marching to join Gen. McCulloch in Arkansas. Sigel encountered them about eight miles from Carthage, posted upon a ridge near Brier Creek, with the artillery, four guns, in the centre, the infantry in the rear, and the cavalry (a large contingent) on both flanks. His own command consisted of the Third and a battalion of the Fifth Missouri Union volunteers, two companies being of artillery, and a small body of regulars. He opened upon the enemy with his guns, which created great havoc, and so scattered their cavalry that they could not charge. Their centre gave way after two hours' fighting, but it was soon manifest that a force of 1500 had been detached to cut off his baggage-train, which had been left 3 miles in the rear. He was therefore obliged to call up the train and to retreat towards it. He was successful in reaching it, and, placing it in the centre, he then cut through the cavalry in his rear and continued his retreat. Again he found himself impeded by a force posted on a bluff overlooking the only road. Making a feint on the right and left, as if trying to escape, he gained an oblique artillery-fire in both directions, and charging in front he again cleared the road. Thus retiring and fighting, he reached Carthage,

harassed by superior numbers. Thence he marched to Sarcoxie, reaching it on the morning of July 6. His entire loss was 13 killed and 31 wounded, while that of the enemy was between 350 and 400. The fighting on the Union side was principally with artillery, which was well served and did great execution. (H. C.)

CARTHAGE, a village of Jefferson co., N. Y., is on the E. bank of Black River and on the Utica and Black River Railroad, 74 miles N. of Utica. A branch of this railroad connects it with Watertown, 17 miles W., and it is connected with West Carthage by a bridge. From this point to Lake Ontario the river descends, in a series of rapids, 480 feet. The dam at the head of the falls, built and maintained by the State, is 900 feet long, and causes slack-water navigation for 22 miles. The abundant water-power is used in manufacturing pig iron, wooden ware, wood-pulp, wooden and steam pumps, leather, lumber, carriages, doors, sash, blinds, stoves, axes, car-wheels, and many kinds of machinery. The town has a bank, a weekly newspaper, seven churches, a monastery, a graded school and other schools. It was settled in 1798, and for a time was called Long Falls; it was incorporated in 1841. Population, 1912.

CARTWRIGHT, PETER (1785–1872), one of the most remarkable characters among the pioneer preachers of the Methodist Episcopal Church, was born in Amherst co., Va., Sept. 1, 1785, and died at Pleasant Plains, Ill., Sept. 25, 1872. In 1793 his father, a soldier of the Revolutionary war, removed to Logan co., Ky., Peter being at the time eight years of age. It was in the midst of the hardships and the vices of frontier life that Peter Cartwright passed his boyhood. The nearest mill was forty miles away, and corn was ground with pestle and mortar. A deerskin stretched over a hoop and perforated with the heated prongs of a fork constituted the sieve through which the meal was shaken when specially prepared for use. Schools were few, and these not worth the name. Churches were equally scarce, and by the greater part of the inhabitants Sunday was given up to dissipation and sport. Hunting, fishing, horse-racing, card-playing, and dancing were the Sabbath pastimes in most general favor. He describes himself as "a wild and wicked boy, delighting in horse-racing, card-playing, and dancing" (*Autobiography*, p. 27). His father did not care to restrain him, but gave him cards for gambling and a fast horse for racing. His mother talked with him and wept over him, her expostulations often melting him to tears. When nearly sixteen years of age he commenced to read the New Testament regularly; he burned his cards, gave back his race-horse to his father, and began a struggle with every sinful habit of his life. Months of darkness and distress followed. Some feared he would become insane, but his mother exhorted him to continue to pray. During the month of May, 1801, a sacramental meeting was held in a grove a few miles away, conducted jointly by Presbyterian and Methodist ministers. Thither young Cartwright went, and there became the subject of a change concerning which he says: "Divine light flashed all round me, unspeakable joy sprang up in my soul. I rose to my feet, opened my eyes, and it really seemed as if I was in heaven" (*Autobiography*, p. 37).

A little more than three years from this time, and while in his nineteenth year, Mr. Cartwright was received as a travelling preacher into the "Western Conference," so called, it being the only conference at that time west of the Alleghanies. The circuits of this conference extended from Detroit to Natchez, and as there were but thirty-six regular preachers in the whole territory, the dimensions of the charges can be easily inferred. The round of appointments on Cartwright's first field required not less than 600 miles of travel. After eight years of circuit work he was appointed by Bishop Asbury presiding elder of Wabash district, a district which then embraced nearly the same territory now included in two annual conferences. Of the sixty-five years of Mr. Cartwright's active labors, upwards of fifty were spent in the presiding eldership of different districts, the last forty-four years of his effective ministry being wholly employed in that office. In 1816 he was chosen a delegate to the General Conference which was soon to meet in Baltimore, Md., and from that time forward he was elected to a seat in thirteen General Conferences successively, his last appearance upon the floor of that body being in May, 1868.

Mr. Cartwright was of medium height, with a broad and muscular frame well suited to the pioneer-work to which he gave the greater part of his life. At threescore-and-ten he was described as "warworn and weatherbeaten. His complexion bilious, the integuments of his face wrinkled and tough, his eyes small and twinkling, his mouth compact and full of force, his head large and round, his forehead deeply indented."

His every movement, even in his old age, denoted energy. He had been drilled in the school of poverty till he called nothing hard. Accustomed to rough experiences and rough men, he undertook that which was difficult without hesitation, and possessed a courage which never feared the face of man. He was not learned in the schools, but he read men with the quickness of intuition. In conquering ignorant opposition, in putting scoffers to silence or shame, and in managing disorderly crowds at Western camp-meetings he had no equals in his time. He was sometimes rude, but always merciful. His wit was ready and keen, in debate he was pithy and humorous, his sermons were blows to right and left, and his rebukes the very besom of destruction.

The strongly-marked peculiarities of Mr. Cartwright in dealing with the characters and facts of those times have placed him in the foreground of not a few newspaper stories, of which he had no knowledge until their appearance in print. That he was sometimes eccentric to a degree not altogether to be admired, much less to be imitated, cannot be denied. But when the state of society in which his early life was spent is considered, many of his daring acts and the rough methods by which he carried important points become only an intense originality. (D. W. C. H.)

CARY, ALICE (1820–1871), an American authoress, was born near Cincinnati, April 26, 1820. She was descended from John Cary, who came to Plymouth colony in 1630 and taught the first Latin class there. Her grandfather, Christopher Cary, removed from New Hampshire to Cincinnati in 1802. She had but slight opportunity for education, yet she began to write poetry at the age of eighteen. She first attracted attention by sketches of rural life contributed to the *National Era* under the signature of "Patty Lee." In 1849 a collection of the *Poems of Alice and Phœbe Cary* was published in Philadelphia. In 1850 the two sisters removed to New York, where they henceforth lived, honored and beloved, maintaining themselves by literary labor. Although Alice in writing was "pensive

and tender," and Phœbe "witty and gay," the former bore the chief responsibility of their household, and yet by her energy and industry contributed not less to various periodicals. In 1851 she published *Clovernook; or, Recollections of our Neighborhood in the West*, which was continued two years later in a second volume, and in 1855 in a third called *Clovernook Children*. *Pictures of Country Life*, 1859, was another volume of the same character. In 1852 she published *Hagar, a Story of To-Day*. Her other novels are *Married, not Mated*, 1856, and *The Bishop's Son*, 1867. Her poems, drawn, like her prose writings, from her own observation of life and nature, are noted for their melody and grace. Edgar A. Poe pronounced her *Pictures of Memory* one of the most musically perfect lyrics in the English language. In 1853 she published *Lyra, and Other Poems*, which called forth severe criticism by their uniform sadness, but proved popular. To the second edition in 1855 she added *The Maid of Tlascala*, a long narative poem. In 1866 she published *Ballads, Lyrics, and Hymns*, consisting of her choicest poems, and in 1868 *The Lover's Diary*, a series of lyrics. After months of hopeless illness she died at New York, Feb. 12, 1871.

CARY, PHŒBE (1824–1871), an American poetess, sister of the preceding, was born near Cincinnati, Sept. 4, 1824. Like her sister, she became a frequent contributor to periodical literature. Her first volume was a collection of *Poems and Parodies*, published in 1854. Besides the volumes issued in the name of the two sisters, Phœbe assisted her pastor, Rev. Dr. C. F. Deems, in editing *Hymns for All Christians*, 1869, and composed several hymns for this volume. She also published *Poems of Faith, Hope, and Love*, 1868. Her hymn, *Nearer Home*, has been acceptable to Christians of all denominations. She did not long survive her sister, dying at Newport, R. I., July 31, 1871. The sisters left poems enough uncollected to furnish four or five volumes. Mrs. Mary Clemmer Ames published in 1873 a graceful tribute to these estimable writers in her *Memorial of Alice and Phœbe Cary*, and edited two volumes of their poems.

CASPARI, KARL PAUL, a German theologian, was born at Dessau, Feb. 8, 1814. He was educated at the universities of Leipsic, Berlin, and Königsberg, from the last of which he graduated in theology, and became in 1847 lecturer and member of the faculty of the University of Christiania, Norway. He gave there a course of theology and exegesis which had a great success and established his reputation as one of the most erudite and able theologians. In 1857 he was appointed professor of theology. He published *Exegetisches Handbuch zu den Propheten des alten Bundes*, in which he was aided by Delitzsch; *Biblisch-theologische und Apologetisch-Kritische Studien* (1842); *Beiträge zur Einleitung in des Buch Iesaias* (1848); *Ueber den Syrisch-ephraimitischen Krieg unter Jotham und Ahas* (1849); a translation of the Psalms into the Norwegian; *Micah and his Prophecy; Commentaries upon the Prophecies of Isaiah; Sources of the History of Baptism and of the Creed* (4 vols., 1866–79); and several works upon the Arabic language, including an Arabic grammar.

CASS, LEWIS (1782–1866), an American statesman, was born at Exeter, N. H., Oct. 9, 1782. His father, Jonathan Cass, of Puritan descent, had enlisted in the Revolutionary army at the age of nineteen, and served through the war from Bunker Hill to its close, retiring with the rank of captain. In 1792 he joined the army under Gen. Wayne, was appointed major, and stationed at Fort Hamilton in Ohio. For his services he afterwards received a tract of land on the Muskingum River, where he settled in 1800.

See Vol. V. p. 158 Am. ed. (p. 181 Edin. ed.).

Lewis, his eldest son, was educated at the famous Exeter school, under Benjamin Abbott, until he was seventeen, when his father started with his family on a tedious journey to Ohio. While they tarried at Wilmington, Del., Lewis taught in a school, and at Marietta, Ohio, he began the study of law with Gov. Return J. Meigs. At the age of twenty he was admitted to the bar, and began to practise at Zanesville. In 1806 he was married to Elizabeth Spencer, and in the same year was elected to the legislature. When President Jefferson called attention to the movements of Aaron Burr on the Ohio River, Mr. Cass introduced a bill conferring power on the governor to arrest all concerned in the affair, and in consequence Burr's boats and stores were seized. He also drafted a complimentary address to the President, which was adopted by the legislature, and Jefferson soon after appointed him United States marshal for Ohio, which position he held till 1813.

When war with Great Britain was threatening in 1812, Cass raised a regiment of volunteers, and marched 200 miles through the wilderness to Detroit, expecting to unite with other forces under Gen. Hull for the invasion of Canada. But as the British had been informed of the declaration of war sooner than Hull, they had already seized the fort at Michilimackinac, and thereby secured the alliance of the Indians. A council of war was held, and Col. Cass urged a forward movement, while Gen. Hull, distrusting the militia, hesitated, but finally consented. The army crossed the Detroit River July 11, Cass being the first to land in Canada. A proclamation written by him was issued, assuring the inhabitants of protection, but declaring that no quarter would be given to those found fighting in company with Indians. Col. Cass had taken a position some distance in advance, when Gen. Hull, finding his force outnumbered, and fearing that the Indians would be let loose upon the Territory, surrendered to Gen. Brock. Col. Cass, released upon parole, hastened to Washington and indignantly denounced Hull as a traitor. As soon as an exchange was effected, Cass was commissioned as colonel in the regular army, and raised a regiment in Ohio. He joined the army under Gen. W. H. Harrison, was promoted brigadier-general March 12, 1813, took part in the campaign in Canada, and after the recapture of Detroit was appointed by President Madison governor of the Territory of Michigan. At his suggestion a scientific exploring expedition was sent under his command to the shores of Lake Superior. Mr. Henry R. Schoolcraft, who accompanied the expedition as mineralogist, published a full account of it in his *Travels from Detroit to the Sources of the Mississippi*. Gov. Cass administered the affairs of Michigan with energy and success for nearly eighteen years, assisting immigration and developing the resources of the country. In 1815 he had purchased for $12,000 a tract of 500 acres in Detroit, which became in the course of time immensely valuable.

In August, 1831, he was appointed by President Jackson Secretary of War, and during his administration conducted the Black Hawk war and gave instructions to Gen. Scott during the Nullification troubles in South Carolina. He also enforced the removal of the Indians from the State of Georgia to the territory west of the Mississippi. This policy, though insisted upon by the whites of Georgia, was in violation of the treaties with

the Indian tribes, and led to the bloody and expensive war with the Seminoles. In 1836, Gen. Cass resigned his position on account of failing health, and was appointed minister to France, with permission to spend some months in travel. Immediately upon his arrival at Paris by vigorous measures he secured the payment to the United States of interest amounting to $5,000,000 on the claims of indemnity for French spoliations committed in 1798. In the spring of 1837, Gen. Cass embarked at Marseilles on the United States frigate Constitution, and spent eight months in visiting the countries on the shores of the Mediterranean. Returning to France, he resumed his duties, and especially enjoyed familiar intercourse with King Louis Philippe, whom he sketched in pleasing colors in his work on *France, its King, Court, and Government*. 1840. Great Britain, having emancipated the slaves in her dominions in 1837, had for some time been urging upon other leading nations the suppression of the African slave-trade, and for this purpose she proposed in 1842 to Austria, Russia, Prussia, France, and the United States what was called the Quintuple Treaty. This was strenuously opposed by Gen. Cass, on the ground that it involved the right of maritime search, to which the United States had always objected. He published an elaborate address to the French people on the subject, and to his efforts it was due that France and the United States refused to join in the course proposed. Subsequently, when the Ashburton treaty was negotiated by Daniel Webster, then Secretary of State, Gen. Cass, thinking the position he had taken not properly sustained, engaged in a controversy with the secretary, and in September, 1842, was recalled.

He returned to Michigan, and in 1845 was elected to the United States Senate, where he supported President Polk's policy and opposed the Wilmot Proviso, on the ground that Congress had no power to exclude slavery from the Territories. This view he fully set forth in a celebrated letter to Mr. A. O. P. Nicholson of Tennessee, dated Dec. 24, 1847. In 1848 he was nominated by the Democratic party for the Presidency, but was defeated by Gen. Zachary Taylor, the Whig candidate, who received 163 electoral votes from fifteen States, while Gen. Cass received 127 electoral votes from the same number of States. Pending the election, he had resigned his seat in the Senate, but was afterwards re-elected by the legislature of Michigan, and in 1851 was again elected to that position. In 1852 he was a prominent candidate before the Democratic convention, but after several days' balloting the choice fell on Franklin Pierce. In 1854 he voted for the Kansas-Nebraska bill. In 1856, Gen. Cass declined to be a candidate for the Presidency, but supported Mr. Buchanan as the Democratic nominee, and after his election was called to be Secretary of State. When the Southern States passed ordinances of secession, he agreed with President Buchanan in denying that the Federal Government had constitutional power to coerce a State. In December, 1860, he resigned on account of Mr. Buchanan's opposition to the reinforcement of Fort Moultrie at Charleston, then threatened by the secessionists of South Carolina. He returned to Michigan, and henceforth held no public position, though he declared his sympathy with the war for the Union. He died at his home in Detroit, Mich., June 17, 1866.

He published in 1823 *An Inquiry respecting the History, Traditions, Language, etc. of the Indians Living in the United States*. He also contributed to the *North American Review* some articles on Indian affairs, and published several historical and scientific sketches and addresses. His *Life* was written in 1848 by H. R. Schoolcraft, and in 1856 by W. L. G. Smith.

CASSEL, Paulus Stephanus (originally Selig), a German theologian and author, was born in Grossglogau, Silesia, Feb. 27, 1827, of Jewish parents. He was educated at Schweidnitz, and afterwards studied at Berlin, devoting himself especially to history under Prof. Ranke. From 1850 to 1856 he was editor of a newspaper at Erfurt. In 1855 he was converted to the Christian faith, and for three years had charge of the royal library at Erfurt, being also secretary of the academy there. In 1859 he removed to Berlin, and in 1866 was elected to the Prussian Parliament. He acted with the conservative party, and afterwards declined a renomination. He was appointed a preacher in Christ Church, Berlin, where he has since labored with great success, having a Sunday-school with 1000 scholars. In 1869 he delivered a series of discourses on the Roman councils and the history of the papacy which attracted much attention, and in the following year his *German Discourses*, referring to the war with the French, had equal success. He has since been invited to preach in most of the large German cities, and has received the degree of doctor of theology from the evangelical faculty of Vienna. During the anti-Semitic agitation in Berlin he was the only evangelical clergyman that openly defended the proscribed class. His published works are numerous and embrace a great variety of subjects. Among those relating to history are —*Magyar Antiquities* (*Magyarische Alterthümer*), 1848; *Studies in the Edda* (*Eddische Studien*), 1856; *The Tri-lingual Sardinian Inscription*, 1864; *Thrones in History, Symbol, and Legend* (*Kaiser- und Königsthrone in Geschichte, Symbol, und Sage*), 1874; *The Origin of the English* (*Die Abstammung der Engländer*), in which he refutes the notion that the English are derived from the ancient Israelites; *The Jews in History* (*Die Juden in der Weltgeschichte*). Some of his political writings have an interest beyond the occasion which called them forth; for instance, *From Warsaw to Olmütz* (1851). As a theologian he is thoroughly evangelical, and has prepared commentaries on *The Books of Judges and Ruth* (1865) for Lange's great work, and later on *The Book of Esther* (1880). He has written a very full account of the observance of Christmas (*Weihnachten, Ursprünge, Bräuche, und Aberglauben*, 1862), maintaining its original Christian character and its connection with ancient Jewish customs, while strongly opposing the view that it had its origin in a pagan celebration of the winter solstice. He has also written on *The Gospel of the Sons of Zebedee* (1869) and *On the Way to Damascus: Apologetic Treatises* (1874). His latest theological work is *The Symbolism of Blood* (1882). He has also published for several years *Sunem*, a weekly theological and historical journal.

CASTELAR, Emilio, Spanish statesman and politician, born in 1832. He plunged at a very early age into Spanish politics. In the controversy between the Christinos and the Carlists a republican party sprang into being, and in this he placed himself. The popular insurrection of 1854 aroused all Spain, and Castelar, to give vent to the views of his party, established a journal called *La Democracia*, but with his politics there was mingled a strain of theological mysticism which displeased many of his fellow-democrats. He had not long before been appointed professor of history and philosophy in the University of Madrid, but, owing to his political views, he was deprived of his

r. In the important revolution of 1866, which put down by Gen. Serrano, he took part, and was g the first to defend the barricade, but found him- abandoned by his lukewarm friends and obliged to or his life. He went first to Geneva, and then to , and in his absence was condemned to death at . After the great revolution of 1868, which the abdication of Isabella II., he returned to was one of the chiefs in the democratic . He proposed to the provisional govern- ormation of a republic, organized public meet- by his fiery speeches stirred the people against monarchy. Under the influence of his enthu- the democrats carried the municipal elections in all over Spain except in Madrid, and Cas- was guine as to the result. But the tide was ady turning. In the February following the gene- elections went against him, and he found himself he Cortes the chief of a minority. His motion to are a general amnesty for all political offences was ated. He combated vigorously the proposition to te a regency, but he also refused to take part in a ublican insurrection which broke out in October. eighteen months he contested the schemes of monarchists and opposed all their candidates for throne, especially the duke of Aosta, the second of Victor Emmanuel, who had been presented by al Prim. A motion of censure which he pro- on Nov. 3, 1870, was lost by a vote of 122 to he maintained his opposition, even after the called Amadeus landed at Cartagena. When, a brief trial, Amadeus abdicated the throne on the h of Feb., 1873, Castelar again gained influence; he e minister of foreign affairs by a large vote, and apacity addressed a circular letter to the Euro- powers, in which he declared the peaceful inten- f the republic and the loyal support of the army. ough his influence the resolution abolishing slavery Porto Rico was passed, March 23, 1873. Soon after addressed the Cortes in a speech of counsel and ad- , and r d his portfolio; but his services were ded. was declared the national executive. In post he set to work to bring order and law- nto the democratic ranks, and to restore the f the army. The revolutionary spirit was oughout Spain; there were many parties, the Cor was in an uproar. He became involved q with Señor Salmeron, the president of the te, demanded the restoration of two members the council who had been suspended, the withdrawal the nominations of certain bishops, and the retire- nt of certain generals. These Castelar refused, and a test vote of 120 to 100 he was not sustained. He Spain, and travelled in France and Italy, where he verywhere received with the greatest distinction. the *pronunciamiento* of Martinez del Campo the of the deposed Isabella II. was proclaimed as XII., and monarchy was again triumphant. returned to Spain and took his seat in the he protested against the oath of allegiance, a resolution in favor of universal suffrage, com- t new constitution clause by clause, spoke often stly in favor of religious liberty, declared that uld be elected by the municipal councils, that military service should be made obliga- published writings are mainly political ora- and discussions, including a *History of the Repub- Movement* in Europe (1875), a *Life of Byron* 75), and *Parliamentary Speeches* (3 vols. 1871). His principal work is on *Art, Religion, and Nature in Italy* (1874). In 1879 he was elected a member of the Spanish Academy. (H. C.)

CASTELLIO (or CASTALIO), SEBASTIAN (1515–1563), was born at St. Martin du Fresne, then a village of Savoy, afterward of France. He was educated classically at Lyons, but never attended any university. In Strasburg he met with Calvin during the Reformer's temporary exile from Geneva (1538–41), and on his return to that city Castellio was called to the rectorship of the schools of Versonnex. But doctrinal differences between the two men, culminating in Castellio's rejection of the tenet of predestination, led to his dismissal in 1544. He proceeded to Basel, where he lived for several years in deep poverty, translating the Bible into Ciceronian Latin and into French, and depending upon work for the printing-offices. He set up a boarding-school for boys, and in 1552 became the professor of Greek in the city's university, and continued in this office till his death. His quarrel with the Genevese theologians continued, and led to an interchange of pamphlets, in which Castellio showed the best temper, and Beza, then at Lausanne, the worst. When Servetus was burnt for heresy in 1553, the Protestant theologians generally expressed their approval. But Castellio published, under the pseudonym "Martinus Bellius," a pamphlet in defence of the principle of toleration, containing testimonies of Luther Brenz, and others adverse to the use of the civil power against opinion. It was translated from Latin into French, German, and Dutch. Beza replied, and the bitterness between the two increased. Castellio gave his enemies a handle against himself in 1563 by translating from the Italian Ochino's *Dialogue* containing a defence of polygamy. Beza, after securing from the senate of Basel an order forbidding him to defend in print his opinions on predestination, began a final onslaught on Castellio, which the latter understood to mean that he was to be dealt with as Servetus had been. Less than a month after replying to the written accusation sent to the senate from Geneva, he died, Jan. 4, 156¾, his troubles and anxieties contributing to his death.

Castellio is interesting as a theologian, as a humanist, and as the first champion of the principle of toleration. His opposition to Calvinism led to the name "Castellionist," having the same sense in his century that "Arminian" bore in the next. In all controversies he showed an amicable spirit, and an abstinence from personalities and abuse rarer in that age than in later times. His own views tended to mysticism; he translated into classic Latin the *Theologia Germanica* (Basel, 1557; 7th ed., Leipsic, 1730, ed. by J. G. Pritius) and the *Imitation* (*De Christo Imitando*, Basel, 1556; frequently reprinted). His Latin version of the Bible (Basel, 1551; 8th ed., Leipsic, 1750) was a careful and faithful rendering, but the medium was not chosen happily. His own opinions on controverted points are given in his posthumous *Dialogi Quatuor* (Basel, 1578; 3d ed., Frankfort, 1696). As a humanist he is commemorated by his editions of Thucydides, Xenophon (1555), Herodotus (1559), Diodorus Siculus (1559), and Homer (1561), and the *Sibylline Oracles* (1546). Jakob Maehly's biography (Basel, 1862) supersedes all others. (R. E. T.)

CASTORIDÆ, a family of sciurine simplicident rodents, of which the single living representative is the BEAVER (which see), the so-called "fossil beaver" of North America being placed in a different family (*Castoroididæ*). There are, however, several fossil

genera, as *Diobroticus* and *Stenofiber*, with probably *Trogontherium*, *Palæocastor*, and others. Referring to the article BEAVER, some technical characters of *Castoridæ* may be added. In the uro-genital system there is seen a relationship of a rodent family of placental mammals with the implacental marsupials, in that the organs open into a common cloaca. Weberian bodies are remarkably developed as a uterus masculinus: there are several associate glands, among them the "scent-bags" which secrete the commercial article known as castoreum; the stomach has a glandular appendage, and the salivary glands are enormously developed. The tibia and fibula unite below in old age, contrary to the rule in the sciurine series of rodents; still, it is not that true ankylosis which occurs in murine and leporine *Rodentia*. There is an accessory carpal ossicle; the clavicles are perfect. The skull is massive, without postorbital processes; the dentition powerful, with rootless or only late-rooting molars; $p.\ m.\ \frac{1-1}{1-1}$. The family nearest related to the *Castoridæ* among living rodents is the *Haplodontidæ*. (E. C.)

CATALANI, ANGELICA (1779–1849), a celebrated Italian singer, was born at Sinigaglia in 1779, or, according to others, in 1784. Her father, a magistrate of the town, being deeply religious, intended that she should lead a conventual life, and therefore sent her to the convent of Santa Lucia in the duchy of Urbino, near Gubbio. When about eleven years of age, her voice having attracted much attention from irreligious visitors, the bishop refused to let her sing solos in the chapel services, but only in concerted music with the other novices. On her health failing from over-study, she left the convent, and was fortunate enough to obtain instruction in music from Marchesi. Signor Catalani reluctantly consented to her becoming a public singer. She sang at the age of sixteen in the opera of *Lodoiska* at Venice, and in 1798 was heard throughout all Italy. In 1804 at Lisbon, and in 1806 in Paris, she appeared with success, and in the winter of 1806 made her first appearance in London in *Semiramide*. Here she remained until 1814, and then returned to Paris, where she conducted the Italian opera for four years, and lost large sums of money through the bad management of her husband, M. de Valabrègue, formerly a captain in the French army. She then made concert-tours throughout Europe, returning to England in 1821, and again in 1824. She retired from the lyric stage in 1831, and resided on her estates near Lake Como, where she founded a school for young girls, who paid no fees, but on graduating were obliged to adopt the name of Cruvelli. In the summer of 1849 she removed to Paris with her three daughters, but in a few days was attacked with cholera, and died June 12. She left an estate valued at 8,000,000 francs. Her eldest son became an equerry to Napoleon III.

Catalani's voice was a pure soprano of extremely large compass and power of tone, and she gained great applause by the brilliancy of her vocalization in rapid, florid passages. Her love of grace-notes and ornamentation made her specially welcome in the concert-room, where the power to create astonishment is always well rewarded. Even on the operatic stage she did not disappoint her admirers in this particular, but imitated the songs of birds and introduced rapid chromatic scales. Hence, artistically, she was not the equal of many singers of the time in sacred music or parts requiring great pathos. Her mental powers generally were not cultivated to the degree that her endowments merited, and hence her art, great as it was, failed to satisfy certain orders of minds. But when it is considered that to physical beauty, high animal spirits, equable temper, and artistic gifts Catalani added the utmost purity of soul, generosity, and warm affections, it will not be thought surprising that she was the idol of thousands of persons. (S. A. P.)

CATALPA. This American tree is, except the trumpet-vines *Bignonia* and *Tecoma*, the only representative in the United States of the large order *Bignoniaceæ*. In the earlier days of botany it was known as *Bignonia Catalpa*, and it is so described by Linnæus, but was separated by Jussieu, chiefly on account of its having a two-parted calyx, corolla with a ventricose tube and four-parted limb, two fertile and three sterile stamens, and the dissepiments of the capsule opposite the valves; while *Bignonia* has the dissepiments parallel with the valves, four fertile and one infertile stamen, the campanulate limb of the corolla of five unequal lobes, and the calyx nearly entire or with five small teeth. It was overlooked by the early American botanists, and seems to have been first noted by Catesby in South Carolina in 1728. The name "Catalpa" is said by some to be a corruption of Catawba, and applied to this tree because first found among the Catawba Indians; by others, that it was the name given by the Indians themselves to the tree. Of late years it has been discovered that the kind growing on the lower Mississippi is distinct from the species common farther East, and it is remarkable that the early French settlers associated this also with the Indians of that region under the name of *Bois Shavanon*, or the "Shawnee's Wood." The Eastern form is known as *Catalpa bignonoides*—the South-western as *C. speciosa*, so named by Dr. Warder from the larger and more showy flowers, which appear about two weeks earlier than the others. He first noted the difference between them in the *Horticultural Review* for 1853. Botanically, it is easily distinguished by the seeds, which have the fine cottony hair at the ends spread flat like a comb, while in the *Catalpa bignonoides* it is somewhat twisted together; the lower lobe of the corolla is notched, not entire, as in *C. bignonoides;* and the bark, smoothish and somewhat scaly in the latter, is usually deeply fissured in older plants of *C. speciosa*. The distinctions are important, as the South-western form is said to make a stem straighter than the other, and thus more desirable for timber-planting. In the North-west it seems to thrive a degree or so farther north than the Eastern species, and perhaps is adapted to timber-culture in Dakota or Minnesota.

The Catalpa has become very popular with forest-tree planters. Rafinesque, writing in the early part of the present century, notes that it was then famous for the durability of the wood, and the evidence for this good quality is overwhelming. G. W. Alves of Henderson co., Ky., reports that two kinds are distinguished in that region, the White and the Yellow Catalpa, and that the former endures as posts only from ten to twenty years. Posts of the Catalpa wood are known to be fifty or more years old, and so sound as to probably endure for a century. W. R. Arthur, in 1871 superintendent of the Illinois Central R. R., after careful tests extending over some years, reported the wood admirable for railroad ties; "though not retaining the spikes quite as well as oak, yet sufficiently well for all practical purposes." After full investigation other railroad officials have been satisfied of its great value for railroad purposes, and in 1879 the Fort Scott R. R. Company planted in Kansas 100,000 young trees as a

future source of timber for their road. It bends before breaking more than oak or ash. Pieces an inch thick, one foot between supports, have not broken till under a pressure of 703 pounds—about the same in this capacity with oak and ash. The wood polishes well, and is extensively used in railway-car manufacture and by undertakers. It is a very light wood, comparing with ash in this respect. Besides the value of its timber, it has the advantage of rapid growth. In the courtyard of Washington, Ark., are trees of the *C. speciosa* brought from the Red River in 1840, two of which measured, in 1881, 11½ and 10½ feet round four feet from the ground. The same species in Central Ohio has grown large enough in five years from the seed to be used for posts for wire fences. Dr. Warder notes a tree at Terre Haute, Ind., fifteen years planted, which had grown to 21 inches in diameter. Many large specimens of the Eastern species have been reported. Along the Catawba River in North Carolina, where they were first observed by Catesby in 1726, the writer of this has measured them 50 feet high and about six feet in circumference as the average mature size about four feet from the ground. Lower down they are often very thick. One in Fairmount Park, Philadelphia, is 13 feet at one foot from the ground. One in Washington Square, Philadelphia, planted in 1816, was 8 feet in circumference 4 feet from the ground in 1880. The writer saw a tree cut down at twenty-five years of age which was 18 inches across. The timber is very poor for fire-wood, igniting badly and smoking away. No insect is known to prey on it.

Considerable interest has been manifested in the geographical distribution of the Catalpa. The earliest observers, like Nuttall, believed it "to have been introduced by the aborigines," and perhaps this impression suggested the common Indian name by which it is known. The Catawba Indians, however, are believed to have travelled from northern regions to South Carolina, and the tree is not indigenous north to any extent, though a few scattered trees are found up to the Canadian line. The Shawnees also came down from Wisconsin and other Northern States, and could not have brought the tree with them. It could not have been brought from Japan, as, though two small-growing species are there indigenous, they are unlike either of the two American kinds. The Catalpa is rarely found in forests, but this may be owing to taller-growing trees, through the long ages, crowding out the smaller light-loving species, which, in the struggle for existence, had to take to open places in alluvial bottoms or along river-banks in order to live at all. Its whole character indicates a relationship with a very old race which has barely been able to sustain itself against the incursions of newer forms. The flattened lobes of the stigma, as well as those of the Bignonia, are sensitive, and close slowly on being touched, indicating in this respect some relationship with *Mimulus*, *Torenia*, and others in the order *Scrophulariaceæ*. (T. M.)

CATASAUQUA, a borough of Lehigh co., Pa., is on the E. bank of the Lehigh River, 3 miles above Allentown and 60 miles N. N. W. of Philadelphia, on the Lehigh Valley Railroad, the New Jersey Central Railroad, and the Catasauqua and Fogelsville Railroad. The river is here crossed by railroad and other bridges. It has a national bank, seven hotels, two weekly newspapers, nine churches, and fourteen schools. It has the extensive Crane iron-works, rolling-mills, Lehigh car-works, two foundries, and a fire-brick works. It has gas- and water-works. Its public debt is $39,000, and its yearly expenses $8500. It was settled in 1839 and incorporated in 1854. Population, 3065.

CAT-BIRD, a small oscine passerine bird, the *Mimus* (*Galeoscoptes*) *carolinensis*, of the sub-family *Mimineæ*, which includes the mocking-bird, and is now commonly referred to the thrush family (*Turdidæ*), though it has some evident relationship with the wrens (*Troglodytidæ*). The species of *Mimus* are numerous, but the present one is the only representative of the section *Galeoscoptes*. The cat-bird inhabits the United States and a portion of British America, but especially the regions east of the Plains; also Mexico, Central America, and the Bermudas in winter. It is an abundant and familiar inhabitant of shrubbery and undergrowth of all kinds, and derives its common name from the singularity of its note of alarm or displeasure, which resembles the mewing of a cat. But it is also a fine songster, ranking with the thrasher or brown thrush (*Harporhynchus rufus*) and other members of *Mimus* and related genera. The nest is constructed of twigs, bark-strips, leaves, and grasses, and placed low in a bush; the eggs are four to six in number, deep greenish-blue, not spotted. The length of the bird is about 8¾ inches; extent of wings, 11 or more; wing, 3¾; tail, 4; bill, ¾; tarsus, 1. Contrary to the rule in *Mimineæ*, the tarsal scales are sometimes obsolete, as in the true thrushes. The color is slate-gray, paler below; the crown of the head, tail, bill, and feet black; the wings blackish, edged with the body-color; the under tail-coverts chestnut, forming a conspicuous mark. The general form is that of a mocking-bird. The cat-bird is chiefly insectivorous, but also feeds much upon berries and other soft fruits; it is a migratory species, breeding throughout its United States range, but resident in the Southern States and beyond. Its abundance and familiarity too often bring it into undeserved contempt; it is a useful bird to the agriculturist, and its musical ability is of a very high order. (E. C.)

CATHARTICS. Cathartics are remedies which are employed for the purpose of provoking discharges from the bowels. They are divided into laxatives, purgatives, hydragogues, and drastics. A laxative is a substance which is used solely for the purpose of provoking alvine discharges a little looser than natural. A simple purgative is one which acts decidedly, but not very violently. A hydragogue is a remedy which produces very free watery discharges. A drastic is one which irritates very greatly the bowels.

Laxatives act in two ways: first, by a direct action which they exert upon the intestine; and secondly, by means of their bulk. It is a general rule that all foods which contain a large amount of waste material have a tendency to produce looseness of the bowels. It is well known, for instance, that in herbivorous animals the stools are habitually soft, whilst in Carnivora constipation is the rule. Consequently, cracked wheat, unbolted flour, and oat-meal are much more laxative than the ordinary form of flour, because the latter has been deprived of its non-nutritious bran, and the bran itself has a more decided laxative power than even the cracked wheat. Vegetables, for the same reason, are much more laxative than meat. Fruits, both dry and fresh, act in great measure by the amount of residue in them, but in most cases have also a direct influence upon the intestine. Sugar, molasses, and other saccharine materials contain no waste material, but are laxative on account of a direct influence which they exert upon the alimentary mucous membrane. Milk contains, practically, no material which is not applicable to the needs of the

economy, and leaves therefore no residuum in the intestine. When properly digested, it is consequently one of the most constipating of all articles of diet. This influence is intensified by removing the butter in the form of cream or by boiling the milk, since even the blandest oleaginous substances have some laxative power.

In all cases of constipation it is much better to regulate the bowels, if possible, by altering the diet and by attention to the habits of the patient than by the use of medicines, as even the best selected laxatives are prone to lose their influence, so that continually-increasing doses are required. But a great deal can be done in these cases by determined effort on the part of the patient to have a stool at a certain time every day. Unfortunately, many articles of diet which are laxative are at the same time of difficult digestion, and care is often necessary lest the dyspeptic patient be as much injured in one way as helped in another by a change of food. In very many instances the habitual use of enemata suffices, and is preferable to the continual taking of drugs. In selecting the time of defecation the person suffering from habitual constipation should be guided largely by the exigencies of his individual life, although (*cæteris paribus*) after breakfast is preferable. Nothing should be allowed to interfere with retirement at the time determined upon each day, and when the natural effort fails an enema should be resorted to—a pint to a pint and a half of cold water being used. Very frequently drinking a full tumbler of water immediately upon getting out of bed has a most happy effect.

When laxatives are habitually required, it is usually better to employ a saline, as Rochelle salts or one of the natural waters. In all cases the saline should be taken largely diluted, and before or just after the patient leaves the bed in the morning. As a substitute for the saline, or to alternate with it, an excellent laxative pill may be made by mixing 1 grain of aloes, 1 gram of the compound extract of colocynth, and ½ of a grain of extract of belladonna. It is very important that persons who are habitually constipated should avoid proprietary pills, because many of these contain mercury, and no confidence is to be placed in statements as to their ingredients.

The *purgatives* ordinarily in use are castor-oil, rhubarb, senna, colocynth, aloes, podophyllin, and the salines. Of these castor oil is prominent as being non-irritating, whilst to the resin of podophyllum are commonly ascribed peculiar powers over the liver.

The *hydragogue cathartics* largely employed are elaterium and jalap, whilst croton oil may be taken as the type of the drastics. A hydragogue cathartic is used especially in cases of dropsy when it is desired to cause absorption of collections of fluid by emptying the blood vessels of a considerable portion of the watery constituents of the blood. A drastic is employed when it is justifiable to irritate the intestinal tract in order to relieve, on the principle of counter-irritation, some more vital organ, such as the brain.

If dangerous hyperæmesis be produced by an overdose of one of these remedies, the patient should be put to bed and absolute quiet strictly maintained. A large mustard poultice should be put upon the abdomen, of sufficient size to cover the whole of it, and opium should be freely exhibited. The opiate should always be in the liquid form, so as to secure promptness of action. In some instances, hypodermic injections of morphia have been used with benefit. When the drug taken has been free from irritant properties, large doses of aromatics with chloroform may be administered with great advantage. (H. C. W.)

CATHARTIDÆ (Gr. καθαρτής, a purifier, scavenger), a family of American vulture-like birds of prey, constituting the sub-order *Cathartidæ* of the order *Raptores*. These birds were long classed in a family, *Vulturidæ*, with the Old-World vultures, but are so widely different from the latter (which belong with ordinary hawks in the family *Falconidæ*) as to require not only a family, but also a sub-order, to be constituted for their reception. The head and often much of the neck is bare of feathers; the very large nostrils are perforate; the bill is comparatively weak, and little hooked, contracted at the base; the eyes are flush with the side of the head, having no superciliary shield; the wings are very long, ample, and strong; the powers of flight are unsurpassed. The feet are formed as in gallinaceous rather than in raptorial birds, with a short elevated hallux, long front toes webbed at base, and comparatively weak claws. There are various anatomical characters, among them absence of cæca and syringeal muscles. On the wing the *Cathartidæ* are graceful in the extreme, circling high and for indefinitely protracted periods without visible motion of the wings, and they walk on the ground better than most *Raptores*. They are voracious and indiscriminate carrion-feeders, filthy in habits to the last degree, and their ordinary means of defence is by vomiting the putrid contents of the crop. But these foul and ill-smelling birds are among the most serviceable of all to man, acting as efficient scavengers in warm countries where men could scarcely dwell were it not for their good offices. They seldom attack animals capable of offering decided resistance, but frequently destroy those which are sickly, disabled, or new-born. There are only six or eight species, referable, however, to five genera. The great Andean condor (*Sarcorhamphus gryphus*) is perhaps the largest and most notable of these, its nearest ally being the king vulture (*Gyparchus papa*), the range of which probably extends a little north of Mexico. The well-determined United States species are three, of as many genera: (1) The Californian condor (*Pseudogryphus californianus*) inhabits the Pacific coast of the United States. It is scarcely or not inferior in dimensions to an average condor, in stretch of wings at any rate, these being some 4 feet long and about 9 in extent, the wing from the carpal-joint, 2¾ feet; the tail, 1½. Most of the neck as well as the head is naked, the plumage commencing with lengthened lanceolate feathers, which continue on the breast. The color is blackish-brown, with gray and white on the wings; the head bright-colored; the iris carmine. (2) The turkey-buzzard (*Cathartes aura*) is widely distributed from British throughout North, Central, and South America, and in most localities abundant. This is about 2½ feet long and 6 in extent of wings; the bill is white, the head red; the feet pale-reddish; the eye brown; the plumage blackish brown, the long quills ashy-gray on the under surface. The plumage begins evenly all around the neck. This is the large dark bird so frequently observed sailing high over head with motionless wings, the tips of the longest quills bent upward and spread apart like fingers. It nests on the ground or on stumps and logs, laying two eggs, which are white, blotched with dark brown and neutral tints. (3) The carrion crow or black vulture (*Catharista atrata*) is practically confined to the Southern States and warmer parts of both Americas, in some cases frequenting the towns and becoming almost domestic. It is smaller in linear dimensions

than the turkey-buzzard, but heavier-bodied; length about 2 feet; wing, 16 inches; tail, 8 inches. The head is dark-colored, not red, and the feathers run up to a point on the nape; the plumage is blackish, the wing-quills pale underneath and almost whitish toward their ends. The mode of flight is peculiar, as the species can sail no great distance without flapping the wings, and the general aspect during flight is strikingly different from that of the turkey-buzzard. The additional species of the family which have been described resemble one or the other of the two last, and do not appear to be determined with precision. (E. C.)

CATSKILL, the county-seat of Greene co., N. Y., is on the W. bank of the Hudson River, at the mouth of Catskill Creek, 115 miles N. of New York and 35 miles S. of Albany. Here the New York, West Shore, and Buffalo Railroad and the Hudson River Railroad connect with the Catskill Mountain Railroad. There is also daily communication with New York by steamboats. The town has a court-house, two national banks, nine hotels, two weekly and one daily newspaper, seven churches, an academy and other schools. The industries of the town comprise woollen-mills, flour-mills, planing-mills, machine-shops, paper-mills, stone-yards, and ice-houses. From the mountain-summit in the western part of the town there is a view of the Hudson River Valley for sixty miles. Population of the town, 4320.

CATTLE. See NEAT CATTLE.

CAUCUS, a political term applied to a meeting of citizens held for the purpose of securing concert of action at an approaching election. Until the opening of the American Revolution such meetings were entirely spontaneous and unofficial. From that time until about 1830 they tended more and more to become an official part of party machinery, and were regulated to a considerable extent by their respective parties. Since 1830 nominating conventions have taken their place, and caucuses have again assumed their original unofficial character.

I. The ante-Revolutionary origin, and even the derivation, of the word are uncertain. Gordon, as cited below, dates its origin to about 1720, and ascribes it to the father of Samuel Adams and some twenty others who were accustomed to meet together in order to decide on a ticket for a coming election. He notes the fact that some of them were "from the north end of the town, where all the ship-business is carried on;" and Boston tradition gives "the caulkers' club" as the original term of which *caucus* became the corruption. In 1763 the caucus had become a recognized political instrument in Boston, and John Adams mentions in his diary that here "selectmen, assessors, collectors, wardens, fire-wards, and representatives are regularly chosen before they are chosen in the town." The growth of the difficulties which led to the Revolution at once developed a general practice of holding caucuses. Throughout New England, where the towns were the unit of government, the caucus was the natural development of the town-meeting, and was always managed in much the same way; but it took on a distinct revolutionary character from the beginning of forcible resistance, and became really a town-meeting from which "disaffected persons" could be excluded. After 1775 the committees of correspondence appointed by the caucuses became the practical governing bodies of the towns until success was assured. In the Middle States, where there was no such unit of government as the town, the committees of correspondence were revolutionary from the beginning, and so continued until the new State governments assumed control of affairs: in some cases they were self-appointed and acted by common consent; in others, they were appointed by caucuses. In the Southern States the militia "company districts" were a passable substitute for the New England town system, and gave the committees of correspondence something of a representative character. In all the States the emphatic declaration of John Adams, that "our Revolution was effected by caucuses," was justified; and at the close of the Revolution the caucus had become a familiar political instrumentality. The fact that there was now but one political party in the country only made the caucus politically omnipotent.

For the operations of the caucus and committees in New England see 2 John Adams's *Works*, 144; 4 *ibid.*, 34; 6 *ibid.*, 468, 542; 1 Wills's *Life of Samuel Adams*, 509; 2 *ibid.*, 62; 1 Gordon's *History of the American Revolution*, 365; Frothingham's *Rise of the Republic*, 284, 312, 327; 1 Austin's *Life of Gerry*, 299, 390; 6 Bancroft's *United States*, 429. In the Middle States, see 1 Sparks's *Life of Gouverneur Morris*, 22; Jones's [Tory] *History of New York during the Revolutionary War*. In the South the work may be best seen by the proceedings of the so-called "Declaration of Independence" by Mecklenburg co., N. C., May 20, 1775; see J. S. Jones's *Defence of the Revolutionary History of North Carolina*, 203; Cook's *Revolutionary History of North Carolina*; Niles's *Principles and Acts of the Revolution*, 132; 1 McRee's *Life of Iredell*, 256.

II. The outbreak of party feeling which soon followed the inauguration of the Government under the Constitution in 1789 brought caucuses into a new prominence. All the State legislatures were now divided, at first into Federalists and Anti-Federalists, and after 1791 into Federalists and Republicans (or Democrats), and caucuses of the members of the respective parties, in order to secure concert of action in the election of United States Senators or State officers, at once became a feature of party warfare. In such caucuses party lines were usually drawn very distinctly. Outside of them no attempt was made to regulate or control the membership of any caucus which saw fit to meet and nominate candidates. As a general rule, the warm political feeling of the time was a sufficient safeguard against any uncertainty as to caucus membership, but some curious anomalies occurred: as an instance, the names of both Alexander Hamilton and Aaron Burr are on the executive committee of the Federalist caucus in New York City, Feb. 11, 1789, to nominate a candidate for governor. In Congress the supremacy of the Federalists was hardly challenged until 1793, so that caucuses were unnecessary. After that year they were undoubtedly held, though we find no record of them for some years. They were probably unofficial, after-dinner gatherings. Washington's refusal to accept a third term of office in 1796 brought into existence the curious nominating body known as the Congressional caucus. Until 1804 the electors voted each for two persons for President: he who received the highest number of votes became President, and he who received the next highest number became Vice-President, though no Vice-President had been voted for. In 1796, John Adams had been Vice-President for eight years, was the representative man of New England whose support was a necessity to the Federal party, and was in the direct line of succession to the Presidency. But he was no favorite out of New England, and there was a general agreement among Federalist Congressmen that Thomas Pinckney of Maryland, their alternate candidate, should receive universal support. The hope seems to have been that the agree-

ment would be kept in New England as to Pinckney, and violated elsewhere as to Adams, so that the former would become President and Adams remain Vice-President. A similar arrangement, to keep the vote for Jefferson and Burr equal, was made by the Democrats, but the motive in this case seems only to have been a desire to prevent possible Northern jealousy of Jefferson. The agreement was not kept by either party. Both Pinckney and Burr were so far shelved by their respective party electors that Jefferson passed them and became Vice-President. During his term of the Presidency Adams became still more disliked by Federalists outside of New England. They therefore chose Charles Cotesworth Pinckney of South Carolina, a universally respected leader, as their alternate candidate, and formally renewed the agreement of 1796 at a caucus of Federalist Congressmen held in Feb., 1800. The Democrats imitated this proceeding; and ever since that time the electors have been a complete nullity in the American system. Instead of exercising any choice, they have only registered faithfully the choice already made for them by other bodies.

The first effect of the new Congressional caucus system was evil. All the Democratic electors, 73 in number, voted for Jefferson and Burr, and thus neither was elected, though each was superior to his Federalist rivals. The Federalists, 65 in number, all voted for Adams and Pinckney, with a single exception: one Rhode Island elector voted for Adams and John Jay; so that Adams had 65 votes and Pinckney 64, and the 8 votes of South Carolina, if they had been cast for them, would have seated them both without difficulty. The House of Representatives, voting by States, was now to choose between Jefferson and Burr for President. The Federalists, who controlled the House, preferred Burr, partly to baulk the evident desire of their opponents for Jefferson, and partly because they regarded Burr as the less dangerous of the two men. Eight States voted for Jefferson, six for Burr, and two were divided; so that there was still no election. The balloting continued for a week in secret session, with frequent caucuses of both parties; and the Federalists were charged with a design to prolong the deadlock until after March 3d, and then, there being no President, to force some extra-constitutional compromise. But Bayard of Delaware and a few other Federalists had agreed not to allow the balloting to be prolonged to any dangerous extent, and on the thirty-sixth ballot, Feb. 17, 1801, three of them refused to vote; this gave Jefferson ten States, and made him President. From this time the Democratic nominations were made by Congressional caucuses—Feb. 29, 1804, Jan. 23, 1808, May 18, 1812, and March 16, 1816. The only Congressional opposition was in 1808, when Randolph and others of Monroe's friends protested against Madison's nomination by a caucus; and in 1816, when Monroe was nominated by 65 votes, to 54 for William H. Crawford of Georgia. But in May, 1812, the Democratic caucus of the New York legislature revolted and nominated De Witt Clinton against Madison, and in September a caucus of Federalist leaders met in New York City and indorsed Clinton's nomination. With this exception the Federalist caucuses were too informal for record. In 1820 a Democratic caucus was summoned, but was abandoned by common consent, and Monroe and Tompkins were re-elected without the formality of a nomination. All this time new States and new leaders had been growing up, and when the "Virginia dynasty" died out with Monroe's second term, there was an inevitable struggle between the official managers of the Democratic machine, represented by Crawford, and the newer interests, represented by John Quincy Adams, Henry Clay, and Andrew Jackson. Crawford's supporters endeavored to follow out the "regular" method of a nomination by Congressional caucus, but only 68 of the 258 members attended. The rest, friends of the other three candidates, declared war on "King Caucus" and trusted to nominations by State legislatures. In his death, as in his birth, the doomed potentate made trouble. There was no choice by the electors, Jackson receiving 99 votes, Adams 84, Crawford 41, and Clay 37. The House, voting by States, was now to choose between the three highest on the list, and it chose Adams by a vote of 13 States, to 7 for Jackson and 4 for Crawford.

Throughout the lifetime of the Congressional caucus legislative caucuses had been in steady operation. They were open to the same objection as their Washington rival: all the Democrats in a Federalist district were necessarily excluded from participation in the nominating body, and *vice versâ*. Various correctives were applied, the most radical and effective usually being a counter-nomination by dissatisfied or unrepresented constituencies. Sometimes the caucus itself added to its address, besides the names of its members, the names of certain "citizens who happened to be present" from various parts of the State. In 1817, in New York, the supporters of De Witt Clinton for governor, fearing that the Tammany-men, or "Bucktails," would control the legislative caucus, chose delegates in the counties represented by Federalists, and these delegates were allowed to vote in the caucus as if they were members. But this, though the germ of future "State conventions," was an isolated case. Nevertheless, as we approach the year 1824, we find legislative caucuses more and more indisposed to make their existence and actions offensively prominent, and more and more disposed to claim that their members in making nominations were acting "in their private capacities only."

A fuller account of the proceedings of the Congressional caucuses will be found in 25 Niles's *Weekly Register*, 244, and in Hildreth's *United States*, at the respective dates named. In regard to legislative caucuses Hammond's *Political History of New York*, and Niles's *Register* in its constant accounts of the proceedings of those bodies, have been followed.

III. The year 1824 marks the extension of the democratic idea to nominating conventions in the States. Such representative bodies had long been common in all the States for the nomination of members of the legislature and local officials, though the membership was very loosely guarded. Now, for the first time, the idea of extending them into State conventions seems to have arisen. At first it was warmly opposed. A committee of the Pennsylvania legislature early in Jan., 1824, remarked that "until lately the right of a citizen holding a legislative trust to express his opinion on public concerns was scarcely questioned; to maintain this principle seems to have become a serious duty, and firmly to adhere to the example set by those who have gone before." Nevertheless, on the 10th of the same month the legislative caucus recommended a State convention of delegates to nominate electors. With this step the rule of the legislative caucus was at an end. In New York the friends

of De Witt Clinton, in a minority in the legislature, called a delegate convention at Utica for Sept. 21, 1824. This body condemned the nomination of candidates for State officers by members of the legislature. In Oct., 1826, the anti-Clinton, or "Regency," Democrats imitated their opponents and held a State convention at Herkimer. From this time the new convention system became universal in State politics. Legislative caucuses never have fallen into disuse, but their purpose has always been to nominate candidates for offices to be filled by the legislature or to agree upon proposed legislation. In the election of United State Senators the whole contest comes in the caucus of the dominant party: when that is decided the election is practically over, unless the minority of the caucus should take the not very common course of "bolting" the nomination.

The breakdown of the Congressional caucus in 1824 left the parties without a nominating body for presidential elections. Larger interests now controlled the country than could be bounded by the national capital; and yet these new interests had not yet learned how to use their powers. At first the result was an increase, though only temporary, of the influence of legislative caucuses, for these bodies willingly assumed the functions of the defunct Congressional caucus. Indeed, they had usually preceded the Congressional caucus in nominating heretofore. But then their action was tentative only, and intended to be ratified or rejected by the final nominating body: now their action aimed to be final, and the election of 1828 was managed altogether on nominations by State legislatures. But before there could be any exploitation of this political method the democratic idea in nominations had expanded at last to national proportions. The first step was taken by the ANTI-MASONS (see that title). Their weakness in the New York legislature had from the beginning divested them of any reliance upon a legislative caucus, and compelled them to use delegate State conventions; and the same reason now drove them into holding a national convention. In Sept., 1830, a deliberative Anti-Masonic convention met at Philadelphia. Its principal business was to summon the first national nominating convention, which met at Baltimore Sept. 26, 1831. The "National Republicans" (see WHIG PARTY) held their first convention at the same place, Dec. 12, 1831; and the Democrats at the same place, May 22, 1832, for the nomination of a Vice-President, Jackson's candidacy for the leading office being based on common consent or on nomination by State legislatures. Thereafter national conventions became the invariable rule for presidential nominations, and Baltimore the usual place for holding them on account of its neighborhood to Washington and convenience for Congressmen who had been appointed delegates. The Cincinnati Democratic convention in 1856 was the first occasion on which that party broke away from Baltimore as a convention city.

All the parts of a modern party oganization were now at last in existence, and it remained only to combine them. This was done during Jackson's second term (1833–37), not by Van Buren alone, but by a school of politicians at whose head he stood. The main course was in the organization of the lower, or primary, political units. The State and national conventions had come into existence almost full armed; but the district, county, and ward conventions remained generally in their original condition, unregulated by party law, and rather caucuses than conventions. The means to cure these defects was found in the following general method of procedure, which was fully introduced at this time, though traces of its fundamental idea are visible before: (1) Instead of leaving the call of a succeeding convention or caucus to chance or individual action, a standing committee was appointed at each convention to call its successor and to act in the interim as an executive committee. The conventions thus became continuing bodies, and the committees the motive-power; and on this latter foundation all modern party machinery depends. (2) The national convention decided the regularity of State conventions or committees, and the State conventions the regularity of subordinate conventions or committees. The whole thus became a homogeneous force. (3) Instead of paying the committees in money, the offices of the civil service, both of the States and of the nation, were used for that purpose. Removal from them served also as a means of party discipline. Of course the opposition party could not, like the dominant party, so use the offices *in præsenti*, but a distribution *in prospectu* was almost as effective.

All this new system inured only to the benefit of party-leaders and of the small politicians who supported them: the people had no share in the spoils, and no prospect of any. But it made the party which first adopted it almost irresistible. The "discipline" of the Democratic party became the characteristic most bitterly noticed by its opponents, and its first great defeat in 1840 was caused in no slight degree by the popular restiveness under an unaccustomed bridle. Within a very few years, however, Issachar had learned to bear his load uncomplainingly, and every succeeding party has adapted its methods to the general plan worked out from 1833 to 1837. At the present writing (1882) it seems impossible to suggest any substitute for the old, long-tried, and long-hated organization of American parties. Indeed, the difficulty of the organization and the impossibility of finding a substitute are apparently insuperable obstacles to the successful formation of any third party.

In the organization of national conventions the Democratic and Republican parties have always drifted in opposite directions. (1) Democratic conventions have always allowed the majority of delegates from any State to cast the vote of the State, thus disfranchising the minority. This is not often done, unless by a delegation which is voting for a candidate from its own State, but it always may be done: the minority in a State delegation votes by permission of its majority, not of the convention. There remains the danger that a number of States in which the Democratic nominees would have no chance of success may control the convention by enforcing this "unit rule." This danger is obviated by requiring two-thirds of the votes of a convention for a nomination. A Democratic convention is thus primarily a convention of State delegations; and this distinction is emphasized by the exclusion of delegates from Territories, whom the Republicans admit as a basis for a future State organization. (2) Republican conventions, on the contrary, regard only Congressional districts or individual delegates, and have repeatedly allowed minority delegates to vote even when the State conventions had expressly ordered them to vote as a unit. They have, therefore, no "two-thirds rule." But, as the party has become old enough in power to develop a school of "practical politicians," these latter have shown a strong liking for the unit and two-thirds rule, and have even endeavored to capture the party convention by enforcing the unit rule, and taking unfair advantage of the absence of a two-thirds rule. In 1880 they would thus have controlled the admission of contesting delegates and the final fashioning of the conven-

tion but for the insistence of the minorities in three of the State delegations upon their right to vote, and the convention's support of the claim.

The change which took place about 1824 can best be studied in Niles's *Weekly Register* for 1823-25, particularly in the numbers for Jan.–Sept., 1824. A full record of the different national conventions up to 1860 is in Greeley's *Political Text-book of 1860*; thence to 1880 in the *Tribune Almanac*.

V. The evils of the system, to an American, lie upon the surface, and are mainly seen in the primary caucuses. In country districts there is practically no means to regulate the membership of the caucuses, unless the dislike of an intruder's political opponents or his apprehension of personal violence may serve as restraints. It is therefore no uncommon manœuvre for a local leader to swamp his own primary meetings with a force of voters of opposite political opinions or of no opinions at all. Such a manœuvre has even been accomplished by a party wishing to commit its opponents to some dangerous programme or candidate. If the primaries are left unregulated in the cities, the danger is far greater, and they at once become a mere farce. To obviate this danger they are usually regulated too much, and membership in the bodies which hold the primaries is so restricted that they become mere cliques or implements of fraud. Many remedies have been suggested, but the most promising seems to be that proposed in Mr. D. C. McMillan's volume, cited below. Its essential idea is the statutory regulation of caucuses or primary elections, so that all such nominating meetings for any election shall be held at the same time and place. There could be thus no colonizing or swamping of conventions without a corresponding loss to the party which engineers the fraud. The plan is open to one very serious objection—that it would be an attempt to prevent a citizen from voting for a candidate of his choice outside of those named at the primaries, and thus a violation of State constitutions. The objection might be met by allowing any person or organization, on paying the necessary expenses, to set up an extra ballot-box and nominate candidates. Under such a régime the citizen who neglected or refused to legally nominate his own candidate would have no more right to complain of his inability to vote for him than the citizen who neglects or refuses to register has to complain of his inability to vote at all. An effort to procure the adoption of the McMillan scheme by the New York legislature in 1881 was unsuccessful. In Pennsylvania the officers of every primary or delegate meeting must be sworn; and penalties are imposed upon any one who acts as an officer without being sworn, refuses qualified or accepts unqualified votes, commits any fraud in counting, or asks, receives, or offers a bribe. Somewhat similar laws exist in Ohio, Missouri, and California. It is very certain, however, that no remedy will be permanently successful until a reform of the civil service takes away the fundamental evil. Until that time a body of paid and disciplined troops will be kept constantly under arms, ready to find or make a practicable breach in the strongest legal wall that human ingenuity can contrive.

See Albert Stickney's *True Republic*; McMillan's *Elective Franchise in the United States*; and F. W. Whitridge's article on "The Caucus System" in Lalor's *Political Cyclopædia*, for the evils and proposed remedies in primary elections. For the introduction of the so-called Birmingham caucus in Great Britain see *International Review*, Aug., 1880. A. J.

CAUSATION is a fundamental conception of intelligence and a fundamental relation of known existence. Intelligence and known existence are each a process. According to the first and superficial appearance, they are both states rather than processes, and the simplest and most universal description of them seems to be this: viz. that they simply *are*. *Being* is their universal predicate. But, further, scientific examination reveals the fact that they *are*, only in virtue and on condition of something concurrently *done*. Nothing *is*, except on condition that something *takes place*. There is naught that, whether in the ideal realm of knowing mind or in the objective realm of known fact, simply *has* or *possesses* existence. On the contrary, all existence is *maintained*, and *is*, only so far as it is *maintained*. The maintenance of existence is an active process, and this process is a *causal* one. With reference to the process, considered as cause, the resulting state of existence is termed the effect. Cause and effect are thus correlative terms, of which the latter denotes dependence, and the former absolute or relative independence. Cause and effect may also be regarded as different aspects of the same thing, or of the same reality, or real process; and so far as this is true, it is just to say that every cause is *cause of itself* (*causa sui*). Whatever is or takes place, in some sense, causes itself to be or to take place. This notion of causation as self-determination, or *causa sui*, is generic, and reappears, with or without qualification, in all the various senses in which the term Cause is used.

The different senses in which the terms Cause and Effect are employed and understood may be classified as follows: 1. Primary or literal, philosophical, ontological; 2. Secondary or non-literal, subdivided into—*a*. Logical; *b*. Mathematico-physical and phenomenal.

1. The most important analysis and definition of the causal conception in ancient philosophy were furnished by Aristotle, who distinguishes in the case of all things "which are by nature," as also of all works effectuated through the intelligent agency of man, four aspects, to each of which the name of cause is given, as follows: 1. The Material Cause; 2. The Formal Cause; 3. The Cause of Motion; 4. The Final Cause. Of these, the first is purely conditional, and denotes, with reference to the effect to be produced or realized, nothing but a potentiality or possibility. Thus, in the block of marble there lies a possible statue. In earth, air, and water are contained the possible constituents of a future tree. The marble does not of itself create the statue, nor do the material elements produce the tree. But the statue is not without the marble, nor the tree without the elements. Moreover, the perfection of the finished work or result, the statue or the tree, is dependent on the quality of the material employed. Thus, the material cause is only conditional, and corresponds to what has otherwise been termed the passive cause. In other words, it is no true *cause* whatever. The true cause, therefore, is to be sought among the three remaining "causes," or, rather, it is to be sought in all of them at once. For these three, as is perceived and pointed out by Aristotle, are in truth identical, or are, as it were, but different aspects of one and the same reality. By the "Formal Cause," Aristotle understands the *eidos*, the form, idea, type, or definable nature of the thing in question. Thus, the formal cause of all trees is the universal tree-form—of all oak trees, the universal yet specific oak-form, etc. But here, again, it is obvious that we have not yet before us the true cause. The form, idea, or type enters as a necessary and fundamental element into the definition of the essence or completed nature of the tree. But taken by itself it is an imperfect abstraction, and not a power to produce

the tree and by an active process to maintain it in living existence. The tree is not, except by virtue and as the result of a process, whose end or "Final Cause" is nothing other than the specific form or type (*i. e.* the Formal Cause) itself. Thus, Formal and Final Cause are identical. They are the same thing under different aspects. But, again, these two "causes" are not sufficient by themselves to constitute the true cause. The true cause is not without them, and they are *in reality* not without it; viewed in separation from it, they are dead and unreal abstractions. The true cause must of necessity be an actively efficient or productive one, and can accordingly be sought only in the Cause of Motion. But a true cause of motion cannot be sought in another and antecedent motion. Motion may be communicated or transferred, but has no power either to initiate new motion or to determine the law or direction of its own communication or transference. Motion is only an abstract and dependent phenomenon, not a concrete and effective reality. The cause of motion must be concrete and effective; it must have power. A having power, it must possess either absolute, or at least relative, independence. Its power, further, can be manifested only in the form of self-determination. But self-determination is a fundamental and characteristic attribute of intelligence, or of living Mind, Spirit, or Νοῦς. The power which belongs to the cause of motion will therefore be a power of Spirit, or of something generically identical therewith. It will also be living, for "life is energy of Mind (Νοῦς)." The power, life, or reality of mind, so far as it is manifested in dependence on material conditions, or in and through "a body," is called Soul. The Cause of Motion for the tree, therefore, or the immediate, active, and creative principle of its growth and existence, will be its soul. But the "soul of the tree" is only another name for the nature of the tree itself, conceived no longer under the form of abstractions, such as the Formal Cause and the Final Cause (abstract type or species, and end in view), but as what it is in immediate, experimental reality—viz. as the type or end in view immediately and actively realizing itself. The Final and Formal Cause are thus identical with the Cause of Motion. Only, they must no longer be viewed by themselves as helpless abstractions, but rather as actual yet ideal functions of a psychical, and hence living and effective, reality.

Aristotle, as is well known, distinguishes, among natural existences, three kinds of soul, termed vegetative, sensitive, and rational. The vegetative soul has, for its characteristic functions, assimilation and reproduction; the sensitive soul, sensation and, generally, locomotion; and the rational soul, the use of reason. In man the three souls are combined in organic unity. To the question, how the lower forms of soul are to be conceived in separation from the higher, or what, in Leibnitzian phrase, may be the "internal states" of (for example) a purely vegetative soul, it may be difficult to furnish an explicit answer. The question is, however, irrelevant to the matter of fact demonstrated by Aristotle, that the realities (or "forms of soul") thus designated exist, and that *primary reality* and *strict causal efficiency* belong to them alone. The Absolute, according to Aristotle's demonstrations, is Mind or Νοῦς, and the Relative is only to be conceived and known as dependent mind, or mind in various dependent potencies; all of which presuppose, as a condition of their very existence, the Absolute.

It appears, then, that the conception of cause is, as such, of necessity a teleological conception. A true cause is ideally, and not mechanically, determined, and its nature is spiritualistic. Further, every such cause is *causa sui*. We have seen how this is true in the case of natural organisms. The like holds true in the case of human works of art or skill. The physician heals, says Aristotle only by virtue of his having in him the idea (Formal Cause) of health (Final Cause), and in employing means to restore health he is but an instrument for the *realization* or *actualization* of the idea. Still more of obvious truth is there in the assertion that the genuine artist is possessed by a creative idea, which simply realizes itself through his instrumentality. Yet in all these cases the cause is only dependently *causa sui*. The soul of the tree exists only in dependence upon the earlier existence of another tree, in whose seed its "soul" was germinally contained. Further, it is dependent on material causes, as above set forth. Its nature, too, is "specific," and hence only limited or partial. It is not all-comprehensive and absolute. Again, the form of its psychical life is imperfect and dependent. By its limitations, and by its organic dependence on the Absolute, it points to the latter—not abstractly and "ideally," but livingly and really. This is expressed by Aristotle in the guise of an attribution to all "natural" things of a tendency, a yearning or love, which leads them to see or to seek in the Absolute their own law. The true law of all existence, and the inherent law of all purely natural existence, is, so far as possible, to "resemble God." Thus it is that in the realm of finite relations all true causes are only dependently *causæ sui*. God, in whom are no unfulfilled potentialities, and who has therefore no Material Cause, is pure, complete, self-fulfilling energy of Νοῦς. In other words, the Absolute is absolute *causa sui*.

It has seemed best to dwell at this length upon the doctrine of Aristotle, because it represents the result of the first *methodical* and also relatively successful attempt, in the history of European philosophy, to demonstrate the substantive or ontological meaning of causation. The conclusions reached by Aristotle are identical in kind with those which have always rewarded similar inquiry. The search for cause is the search for power, and power is never found or known, and hence never demonstrated, except as an ideal or spiritual value. Those who deny the reality or cognoscibility of all such values—a denial which is always founded on an abstract or partial theory of knowledge as consisting solely in passive sensation—have no explanation whatever to give of *power*. They accordingly seek to explain our belief in it as substantially illusory (Hume and James Mill), or else arbitrarily and dogmatically declare it to be unknowable.

In modern philosophy, which reaches its most perfect systematic expression in Hegel, ontological inquiries have been founded on epistemological ones, or the Science of Being has been approached by the way of the Science of Knowledge more explicitly and obviously than in ancient philosophy. Another peculiarity of modern philosophy results from the circumstance that it has been contemporaneous with a remarkable growth of mathematical and physical science, and has had to formulate its results in such way as to adjust them to modern physical conceptions. Hence a corresponding peculiarity in the way in which the subject of causation is approached and handled by Hegel (for example). The substantive results reached are essentially identical with Aristotle's conclusions. But the law of the process of causation, as essentially an organic process, has

been formulated by Hegel with more of systematic completeness. The English reader may with profit compare, on this part of the subject, Bishop Berkeley's *Principles of Human Knowledge* and his *Siris*.

2. The word Cause, in a non-literal sense, is employed with many different shades of meaning, all of which may be brought under the two heads of Logical and Mathematico-Physical "Causation."

a. Logical. That which accounts for or explains, in any way, any truth, fact, or event, is often spoken of as the cause of such truth, fact, or event, independently of the perception, recognition, or acknowledgment of any true causal relation or productive agency whatever. In all such cases the relation contemplated is purely one of logical implication.

The typical illustration of the application of this notion of logical causation is furnished in the *Ethica* of Spinoza. Here whatever is involved or contained in the conception, nature, or logical "essence" of anything is said to "flow," as an effect, from such conception or essence, as its cause. It is contained in, and hence follows as an "effect" from, the nature of the triangle, that all its angles are equal to two right angles. This is Spinoza's standing example of the causal relation. The relation, as is at once perceived, is one of purely abstract ideal dependence, according to the logical principle of identity. The equality of all the angles of the triangle to two right angles is a part of the nature of the triangle. It is, *pro tanto*, identical with this nature. It is obvious that this is a case of causation only in a non-literal, secondary sense. But if we agree, nevertheless, to *call* it a case of causation, it is evident that, in virtue of the logical identity of "cause" and "effect," or of the "nature" of the triangle on the one hand, and the equality of all its angles to two right angles on the other, the "cause" in question can only be regarded as *causa sui*. Spinoza, however, reserves this designation exclusively for the case of "that whose essence involves *existence*, or that whose nature cannot be conceived except as *existing*." This is variously termed by Spinoza "God," "Nature," and "Substance." Now, the "causal" relation asserted as obtaining between the divine essence and the divine existence is precisely like that above illustrated by the case of the triangle. The divine essence is nothing but the logical conception or definition of "God"—*i. e.* of absolute Being or "Substance"—and the divine existence is simply an identical part of this conception. It is this, and nothing more. It is only a part of a *conception*. But the *name* of this part is *existence*, and the name is ambiguous. For it may denote either the logical conception of existence, or objective reality itself. These two meanings are confused by Spinoza. And in yielding to this confusion Spinoza gives evidence that there lurked unperceived in his mind a (legitimate) feeling that the conception of causation is peculiarly an ontological one, including more than the merely logical relation of abstract identity, which alone is really contained in his definition of *causa sui*, and is perfectly illustrated by his standing example of the triangle, etc. The *conception* of existence, now, is involved in the Spinozistic conception of the "divine" essence. Hence the latter is termed in particular *causa sui*, as though by virtue of the just-mentioned logical relation the divine essence actually gave itself absolute, objective *existence*. This is an obvious *non sequitur*. The divine or absolute Being is, indeed, as indicated in the foregoing section, absolute *causa sui*. But this is not because the definition of his essence includes the conception of existence, but because his existence is grounded in a living process, which itself is wholly self-determined, or dependent on naught foreign to itself.

There is no realm or department among the objects of knowledge where the relation of logical dependence or involution does not more or less explicitly obtain. The ultimate pre-supposition of all science is that "all things consent together," constituting an harmonious or intelligible whole, each part of which, in Leibnitzian phrase, is a mirror of the universe, or logically implies and points to the universal whole. The logical implication here is often less clear and definite than in the case of the triangle and the theorems demonstrable concerning it, since the detail of the relations involved is constantly changing with the changing universe, while the relations of the ideal triangle undergo no change. But, with this exception, the two cases are alike. They are alike in kind. And, now, it may be said in general that all cases of the non-literal use of the terms cause and effect are cases in which the logical relations, or a relation which simulates the logical one, is confounded with the truly causal one. The *ratio cognoscendi* is substituted for the *ratio essendi*. So in the following title of a book recently published: *Capital and Population: A Study of the Economic Effects of their Relation*. The general relation of capital and population involves particular economic relations, which are termed "effects" of the former—of course only in a non-literal or secondary sense. But with this last example we have already passed, practically, into the realm of—

b. Mathematico-physical causation. By this phrase is meant causation as it is understood in purely physical science, whose objective data are all, and characteristically, sensible (acquired through sensible observation), and whose model and instrument of method are found in the mathematical sciences.

The theory of physical causation is peculiarly a product of modern inquiry. Since purely physical science is nothing but sensible—sense-conditioned—knowledge reduced to scientific form, the theory of physical causation is founded in, and is a part of, the theory of sensible knowledge. Inasmuch as physical causation, as a conception of sensible knowledge or of purely sensible relations, is not the same thing as philosophical or ontological or (as we have termed it) true causation, and inasmuch as, in an undeveloped form, the notion of true causation holds the first place in the instinctive thought of mankind, and was also the first to be explicitly and scientifically developed in the historic order of ancient speculation, it follows that the first step toward the development of the conception of physical causation would, not unnaturally, take the form of a criticism of the philosophical conception, conducted by those who held that sensible knowledge, or knowledge of purely sensible and hence mechanical relations, was the only kind of knowledge possible to man. At all events, this negative first step—and this alone—was taken by the ancient Sceptics. The modern discussion, starting especially with Hume, began with a step of essentially similar kind.

The question about physical causation is, What meaning, if any, has the word "causation" within the limits of purely sensible knowledge? Sensible knowledge is knowledge whose form and content are conditioned by the forms of space and time; or, it is knowledge of objects whose fundamental fo and relations are those of space and time. The qu n, t is, What, if anything, is the causal r

or of time? The fundamental relations of space and time are coexistence and sequence. Physical causation will therefore be a relation of coexistence or sequence. More particularly, it will be a relation of coexistence or sequence among sensations or impressions, otherwise termed sensible phenomena or "objects."

Now, according to Hume, all relations of coexistence or sequence among impressions are fortuitous. Moreover, *all* relations among impressions are originally—*i. e.* considered with reference to the order of their occurrence in individual consciousness—relations of succession. Let, now, A and B denote two impressions, one of which (B) occurs after the other (A). Here is a case of matter-of-fact sequence—a *given* relation of succession. What is further to be said about it? Can we say that B was obliged to follow A, just as, according to the philosophical conception, an effect must necessarily follow or accompany its cause? In no wise; for A and B are simply so many "independent existences," having no necessary, nor any other real, connection "that the mind can discover." All that can be said is simply to repeat the immediate matter of fact, that in this case B follows A. If this succession occurs only once, it attracts no special attention. It is regarded as simply fortuitous, and having no special significance. If it occurs several times, A and B become "associated" with each other in our consciousness, so that the thought of the one tends involuntarily to be followed by the thought of the other, and the observation of the one is accompanied by a more or less confident expectation that the other will be presently observed. And when the succession occurs "habitually," the association becomes (in the language of Hume's successors) inseparable, and the succession of B after A is called a case of causation.

Causation, then, viewed as a sensible relation or as a relation of time, is habitual succession. *Per se*, nevertheless, or considered with reference to the nature of the terms (as A and B) which respectively precede and follow each other and are *termed* cause and effect, there is no reason why one should stand in the place of cause and the other in that of effect. To the eye of reason their relation is accidental, and (in Hume's words) "any thing may be the cause of any thing."

Kant took up the problem of physical causation where Hume left it, and subjected it, in the *Critique of Pure Reason*, to a further investigation, which has become famous. As to the substance, or substantial meaning, of physical causation, in particular definite cases or classes of cases, Kant agrees with Hume. Hume's "habitual succession" is but another name for "regular succession," and this Kant finds to be the essential import of physical causation. In what particular order phenomena shall succeed each other—whether A shall, for example, precede or follow B—we can in no wise anticipate. Here reason helps us not, and, for aught we know, "any thing may be the cause of any thing." The actual "rules of succession" among phenomena must be learned by observation. But that which, in advance upon Hume, Kant demonstrates is (we may say) this: viz. that "some thing must be the cause of some thing," or, in other words, that there *must be regular succession* among phenomena. That the particular phenomenon A should regularly precede the particular phenomenon B may be, for our knowledge, an altogether contingent or irrational fact. But that the order of sequence among phenomena, whatever it may be in detail, must be regular, this, Kant demonstrates, is not a contingent but a necessary truth. It is a truth capable of being *a priori* determined, independently of all particular, observed orders of succession, by examining the nature of sensible knowledge itself or of the conditions without which no such knowledge is possible. One of these conditions is that sensible phenomena shall be clad in the form of time. But time, abstractly considered, is nothing but definite and irreversible succession. There must therefore be found among phenomena a definite and irreversible order of succession. Otherwise, time would not be their "form," and they could not enter into our knowledge. Physical causation, then, is regular sequence. It is primarily a regular sequence of perceptions. But since coexistence is known only through perceptions, which themselves take place in time, and are hence successive, it follows that physical causation includes all cases of regular coexistence. In brief, then, physical causation is nothing other than physical law. The conception of such causation strictly excludes the ideas of force and substance. The physicist, *as such*, knows no force, but only motion. Nor is real substance or "being" known to him, but only figured space.

It is plain enough that physical causation is, when strictly interpreted, only by courtesy so called. It is causation only in a non-literal or secondary sense. Our statement that in all uses of the word "cause" the sense of *causa sui* is, "with or without qualification," contained, is here verified through the relation of mathematical equality which subsists between physical cause and physical effect. This is expressed in the principle of the Conservation of Energy, which is now held to express the widest generalization or "law" of physical science. The sum-total of energy—potential and kinetic—is held to be a constant quantity. Its forms are constantly changing, but the value of their sum-total does not change. This is true for a whole "system of things" (*i. e.* of phenomena conditioned by space and time), and is equally true for any portion of such a system. The whole state of things at any instant is the physical "effect" of the whole state of things in the foregoing instant. This means that the present state of things followed by law after the foregoing one, and that the mathematical expression for the present state of things—if this expression could be found—represents exactly the same value as the like expression for the foregoing state represented. Cause and effect are identical in value, and in this sense the former is *causa sui*. (G. S. M.)

CAVALRY. The cavalry arm of the U. S. military service amounted to little during the War of the American Revolution. Two regiments of light dragoons from Virginia and one from Pennsylvania were raised and taken into the Continental service. A fourth regiment was raised, agreeably to a resolve of Congress, in 1776, and a single troop was raised by the same authority in 1778 "to attend the provost-martial." Three legions were also authorized in 1777, 1778, and 1779. On the completion of the war these skeleton organizations were entirely disbanded, to the great annoyance and, as it proved, the discomfiture of Gens. Harmar and St. Clair in their campaigns against the Western Indians. To supply the deficiency, Congress in 1792 gave the President power to raise a squadron to serve for three years. The officers and their monthly pay were as follows: major-commandant, $55 per month; and in each of the four troops—1 captain, $40; 1 lieutenant, $26; 1 cornet, $20; 6 sergeants, $6; 6 corporals, $5; 1 farrier, 1 saddler, and 1 trumpeter, $4. The ; as were to be

See Vol. V. p. 227 Am. ed. (p. 261 Edin. ed.).

paid $3. This nucleus of the American cavalry, organized at Pittsburg in 1793, under Major William Winston of Virginia, moved at once to reinforce Gen. Wayne at Fort Recovery in Ohio. In the battles at that point and at the Maumee Rapids, both in 1794, Gen. Wayne acknowledged the effective co-operation of "the legionary calvary." In spite of this record, however, the whole force, with the exception of two small troops, was disbanded as the periods of enlistment expired in 1795–96. Six troops were added in 1798, the whole now forming a regiment under the command of Lieut.-Col. commandant John Watts of Virginia. The new men were "enlisted for and during the continuance of the existing difference between the United States and the French Republic, unless sooner discharged." An act of Congress in 1799 authorized three more regiments of cavalry, each with five squadrons of two troops each. These regiments were never filled, and in 1800 Congress ordered the disbanding of all but the two original troops. Two years later even this handful was legislated out of existence.

The United States had then no cavalry service, until in 1808 a regiment of light dragoons (eight troops) was organized under Col. Wade Hampton of South Carolina. Leonard Covington afterward appeared as the chief commander. In 1812, Congress authorized another regiment of twelve troops. The main dependence for cavalry during the War of 1812 was upon the volunteer force, which distinguished itself at the battle of the Thames, while the regulars won their laurels at Chrystler's Farm. Congress ordered the consolidation of the two regiments into one in 1814, and at the close of the war once more abolished the cavalry service. It had been shown by the campaigns of Harrison and of Jackson against the Indians that the volunteer cavalry was of inestimable value, both in action and as a material from which recruits might be taken for regular forces. Hence in 1832, when the Black Hawk War arose, Congress authorized a battalion of mounted rangers under Henry Dodge of Wisconsin as major commandant. A year later this was merged into the First regiment of dragoons at Jefferson Barracks, and the newly-formed organization proceeded at once to the West and the South. In 1836, Congress authorized the raising of a second regiment of dragoons at Jefferson Barracks. When organized, the new regiment departed for the seat of the Seminole War under the charge of Col. David E. Twiggs. The First regiment, operating in the South-west, disarmed the Texan invaders of the United States soil in 1843, and in connection with the Second regiment gave important aid to Gen. Taylor at Palo Alto and Resaca de la Palma. Upon the declaration of war with Mexico, Cols. Kearney and Twiggs of the two regiments of dragoons were raised to the rank of major-general, and a regiment of mounted riflemen was authorized by Congress. The latter did effective work as infantry at Cerro Gordo and Chapultepec, their horses having been lost in a storm on the Gulf of Mexico. Dependence for mounted men during this war was largely placed upon the volunteers from the Southern States, who often did the heavy fighting, as at Monterey, Buena Vista, Contreras, Churubusco, and Molino del Rey. Another body of cavalry wrested California from the Mexicans by a bold dash. In 1847 the greater part of the regular dragoons were sent with Gen. Scott toward the interior of Mexico, where they often met those "relentless riders" known as lancers. Congress now ordered a third regiment of dragoons, and the command was given to Col. Edward G. W. Butler of Louisiana. This regiment was disbanded in 1848. The riflemen were also disbanded, but they were at once recruited and reorganized. The annexation of large tracts of territory to the south-western portion of the United States, and the hostility of the Indians who came with the land, rendered the service of the two regiments of dragoons of small account, scattered as the companies were from one end of the country to the other. Congress, therefore, in 1855 ordered the raising of two regiments, to be known as cavalry in distinction from the dragoons. The distinction was practically without a difference, since all of the three classes of mounted men at that time, and since, might be grouped under the generic term "light cavalry."

Cavalry during the Civil War.—As commander of the department of Texas, Gen. Twiggs had already surrendered to Gen. McCulloch of the Confederates Government stores, munitions, etc., to the value of $1,500,000, for which action he had been dismissed the service. The example of Twiggs was followed by most of the officers in the two regiments of dragoons, the regiment of riflemen, and the two regiments of cavalry; almost all of whom came originally from the Southern States. This gave a decided advantage to the enemy, and left the Union service deplorably weak as to the cavalry arm. The proclamation of Pres. Lincoln calling for 75,000 volunteers was followed by an order increasing the regular army, one of the items being the organization of a third regiment of cavalry, which was placed under the command of Col. David Hunter. There was a dissatisfaction among the officers and men of the regulars because Congress had changed the names of the regiments, so that they should be as follows: The First regiment of dragoons to be known as the First regiment of cavalry; the Second dragoons as the Second cavalry; the mounted riflemen as the Third cavalry; the First cavalry as the Fourth cavalry; the Second cavalry as the Fifth cavalry; and the Third cavalry as the Sixth cavalry. These six regiments, fully recruited, constituted the entire regular cavalry during the Rebellion. The work of recruiting for the volunteer service was slow in starting. But after a time, Congress having ordered that each regiment should be entitled to three majors and should consist of twelve full companies, the recruiting was carried on more briskly. Congress also, in 1863, strictly defined the legal organization of a regiment and also of a company. The cavalry bureau of the War Department was established to take charge of all recruits, supplies, dépôts, etc., Maj.-Gen. Stoneman being placed in charge. The volunteer cavalry, as finally recruited during the Rebellion, is recorded as follows: New Hampshire, Vermont, Connecticut, Delaware, Alabama, Texas, Oregon, Colorado, Nebraska, Nevada, and District of Columbia, 1 regiment each; Maine, Rhode Island, New Jersey, Arkansas, and Minnesota, 2 regiments each; Massachusetts, California, and New Mexico, 3 regiments each; West Virginia and Wisconsin, 4 regiments each; Maryland, 6 regiments; Kansas, 8 regiments; Iowa, 9 regiments; Michigan, 11 regiments; Tennessee and Indiana, 13 regiments; Ohio, 14 regiments; Kentucky, 16 regiments; Illinois, 17 regiments; Pennsylvania, 21 regiments; Missouri, 24 regiments; and New York, 25 regiments. In addition to these there were 6 regiments of colored cavalry and several of mounted infantry. It may be readily inferred that the Confederate cavalry not only took the lead of the U. S. cavalry from the start, but

that it also maintained that lead well toward the middle of the Civil War. It is true that Gen. Joseph Hooker collected the cavalry into several corps while he was commanding the Army of the Potomac, but no good results were apparent either in that quarter or among the armies of the West. The brilliant raid of Col. Grierson—who swept through Mississippi from Memphis to Port Gibson—attracted the attention of the military authorities as a splendid piece of work performed by a splendidly equipped organization. The result was the formation of "the Cavalry Corps of the Army of the Potomac," which Gen. Grant entrusted to the command of Gen. P. H. Sheridan. Old army officers shook their heads when they saw that the organization by corps—so fatal to Napoleon—had been carried out with three divisions of 5000 men each. But the result proved the wisdom of the decision, and showed that the former disasters to the Army of the Potomac under Gens. Pope and McClellan might have been averted had the cavalry arm of the service been as well organized and as well drilled as were the infantry and the artillery. Up to this time the prestige of the Confederate cavalry had received no check. The Southerners were good riders and each man owned his horse; hence the success of the dashing raids by Morgan, Mosby, Gilmor, and Stuart. But after the capture of Morgan and Gilmor and the killing of Stuart in 1864, the cavalry corps of the Army of the Potomac became an almost invincible power, aided, as it was, by batteries of flying artillery, chiefly from the regular army. In the campaign of 1864 the first division of the corps was commanded by Gen. Torbert; the second division, by Gen. Gregg; and the third division, by Gen. J. H. Wilson. In addition to the above a smaller division in the Army of the James was commanded by Gen. Kautz. Opposed to this corps was the Confederate cavalry corps of the Army of Northern Virginia under Gens. Wade Hampton, Fitzhugh Lee, and William H. F. Lee. During the same year Gen. Wilson was made chief of cavalry in all the armies of the West. The success of Sheridan's reorganization of the Eastern cavalry led Wilson to try a similar experiment with the Armies of the Ohio, the Tennessee, and the Cumberland, with the same gratifying results. Toward the accomplishing of these results credit must be given to the formation in "double rank" and to the Spencer magazine carbines, as well as to the *morale* that arose from an organization that was far superior to any that had preceded it. The prominent battles in which the cavalry bore a conspicuous part were those of Winchester, Yorktown, Hanover Court-house, Gaines's Mills, Iuka, Corinth, Murfreesboro', Kelly's Ford, Ream's Station, Opequan, Petersburg, Selma, and Five Forks. The leading generals in the U. S. calvary service during this war, besides those already named, were Gens. Pleasonton, Kilpatrick, Brackett, Stanley, and Powell Clayton. Gens. Chalmers and Forrest were the leading Confederates not already noted. The volunteer cavalry was disbanded at the close of the Civil War in 1865, but the regular cavalry was recruited, so that now (1891) it numbers ten regiments, which are used as mounted infantry against the Indians of the West and the South-west. Each regiment contains twelve companies or troops, two troops forming a squadron. The number of privates in the cavalry service was, in 1889, 6842; officers, 437; making a total of 7279.

Arms.—The changes that have taken place in the manner of arming the cavalry are of great interest. The First regiment of dragoons, organized in 1833, was supplied with firearms as follows: one flint-lock pistol and one Hall's carbine per man. These were superseded in 1849 by the percussion pistol and the musketoon. A little later, also in 1849, the Colt's pistol was first supplied, and this weapon gradually took the place of the percussion pistol. In 1853, Sharp's carbines were issued as experimental arms, and they were subsequently sent to both the First and the Second regiments of dragoons. Five companies of the latter were provided with the Colt pistol-carbine, which was the pistol proper with a stock that might be removed at pleasure. In 1858 the cavalry were armed as follows: First regiment—eight companies with Sharp's carbines and two companies with Burnside's carbines; Second regiment, eight companies with rifle-carbines (muzzle-loaders made at Springfield) and two companies with Sharp's carbines. At that time the musketoon, although regularly adopted, had gone almost entirely out of use, because of its short range and want of accuracy. Its manufacture had been discontinued, and down to the breaking out of the war in 1861 no arm had been regularly adopted in its stead, the use of the various kinds of carbines being merely tentative. The only other firearm regularly adopted for the use of the cavalry for several years before the Rebellion was the Colt's pistol, or revolver. There were also no regularly prescribed equipments for horses, the various patterns, such as Jones's, Hopes's, Grimsley's, and McClellan's, being simply experimental. The war of the Rebellion put all theories to the test, and left those results that can come only from severe trials in the field. The Spencer magazine carbine and the Remington revolver shared the reputation of the Sharp carbine and the Colt pistol. The "McClellan" saddle, adapted from the Mexican, with improvements that had been tested in the Crimea, became the standard, together with Blakeslee's cartridge-box and other definite accoutrements. The Ames sabre was often thrown away as useless, its rejection by the Confederate cavalry being almost complete, and more reliance was placed upon the pistol. It has been urged in defence of the sabres that they were so dull as to be useless during a charge. But the truth is, they were discarded because, as a rule, there were no expert swordsmen in the service, and, naturally, the soldier or the man will affect to despise the weapon that he cannot use. It has been suggested that the keen blade of the Solingen sabre should be substituted for the dull blade now in use, and that strict attention be given to sword-exercise. Such a course, it is claimed, would increase the *morale* of the cavalry and render it more invincible whenever it resorts to the charge. But down to the present time nothing could be more assured than the failure of the sabre.

Tactics.—The U. S. system of cavalry tactics, slightly modified, is that of the French service, translated and authorized in 1841 by Hon. J. R. Poinsett, the Secretary of War. This system was adopted because of its peculiar adaptation to the light cavalry as distinguished from the heavy cavalry of the other nations of Europe. During the War of the Rebellion, however, there were few cavalry charges, the nature of the warfare and the topography of the battlefields admitting of no such movements. Whenever the open field was taken, however, the line of battle in corps front was formed in this manner: Each brigade detached a regiment to cover its whole front with a chain of skirmishers that often exceeded a half mile in length; two more regiments followed in line behind each wing, about 200 yards apart, with sabres drawn; the rest of the brigade then formed a third line in column of fours. Such occasions were rare, the duties of the cavalry consisting, for the most part, in making reconnoissances, covering retreats, and picketing approaches. By far the greater part of the actual fighting was done on foot, the horses serving to convey the body from place to place with the greatest despatch. The cavalry thus became a kind of mounted infantry working under the "instructions for

dismounted fighting" contained in the Cavalry Tactics. The men, dismounting from their saddles, were fresh for a run. When they had pushed the enemy and crowded him back, the led horses, now rested, were brought up and the pursuit was continued on four legs instead of two. Retreats were covered in a like effective manner. The advance of an army was protected by a skirmish-line of dismounted cavalry so thinly drawn out that 10,000 men would cover a front of five miles, and yet even the most daring of the enemy would hesitate to break through the ranks that might be so readily concentrated in one spot. (F. G. M.)

CAVEAT, in law, a notice not to do an act, given to some officer, either ministerial or judicial, by a party having an interest in the matter. Caveats are frequently filed with judges of probate courts to prevent the admission to probate of wills the validity of which is contested, or the granting of letters testamentary to persons who it is claimed are not entitled thereto. The effect of such a caveat is to postpone the admission of the will to probate or the granting of the letters until due investigation has been made.

In patent law, a caveat is a legal notice to the Patent Office not to issue a patent of some particular description without allowing the caveator, or person filing the caveat, an opportunity of establishing his priority of invention. Such a caveat is intended to answer a double purpose: 1st, to give notice of the caveator's claim as an inventor; 2d, to prevent the issuing of a patent to another party for the same thing. By the provisions of the Revised Statutes of the U. S., sect. 4902, it is stipulated that any citizen of the United States making an invention or discovery, and desiring time to mature the same, may file in the Patent Office a caveat setting forth the design thereof and its distinguishing characteristics. Such caveat is filed in the confidential archives of the office and preserved in secrecy, and is operative for the term of one year. If within that time application is made by any other person for an invention in any way conflicting with that for which the caveat has been filed, notice thereof is sent to the caveator, who may thereupon, if he pleases, at any time within three months thereafter, establish his right of priority of invention by filing his description, specifications, drawings, and model in the Patent Office.

An alien who has resided in the United States for one year, and who has made oath of his intention to become a citizen, is also entitled to the benefits of this act.

CAVY, any one of several small South American quadrupeds of the family *Caviidæ*, order *Rodentia*. The *Caviidæ* are a family of the Hystricine series of simple-toothed rodents, composed of the genera *Cavia*, *Dolichotis*, and *Hydrochærus* (see CAPYBARA), which agree in being four-toed in front, three-toed behind, all the digits terminating in hoof-like nails; the tail very short or rudimentary; the upper lip not cleft; the incisors short, the molars divided into transverse lobes by folds of enamel, the milk-teeth shed *in utero*. The best-known cavy is that so often kept in confinement under the misleading name of "Guinea-pig," perhaps changed from Guiana-pig; this is the *Cavia cobaya* of authors, supposed with some reason to be an artificial variety of the restless cavy, *C. aperea*; but is not regarded as settled. Other species of the genus *C. boliviensis*, *C. rupestris*, and *C. australis*, all of so[illegible] h A[illegible]a, especially its southern portion, and in [illegible]p to some 10,000 or 12,000 feet. The Patagonian cavy (*Dolichotis patachonica*) is very different from any of the foregoing, much larger, with longer limbs and ears, and altogether more resembling an AGOUTI (which see) of the family *Dasyproctidæ*. (R. C.)

See Vol. V. p. 240 Am. ed. (p. 277 Edin. ed.).

CAYUGAS. See IROQUOIS.

CAZENOVIA, a village of Madison co., N. Y., on Cazenovia Lake and Chittenango Creek, 18 miles S. E. of Syracuse. It is on the Syracuse, Chenango, and New York Railroad at its junction with the Cazenovia, Canastota, and De Ruyter Railroad. It has six churches, the Central New York Seminary, two banks, one weekly newspaper, a public park, three hotels, and manufactures of guns, flour, lumber, woollen goods, machinery, sash, blinds, etc. It was laid out in 1793 on land purchased by the Holland Land Company, and named in honor of their agent in Philadelphia, Theophilus de Cazenove. It was incorporated in 1810, and at that time carried on considerable trade. Its prosperity was diminished by the completion of the Erie Canal. Its property is now valued at about $771,650, and its annual public expenses are about $4000. It is surrounded by picturesque scenery, including several cascades, and is a pleasant summer resort. Population, 2009.

CEDAR-BIRD. See WAXWING, and AMPELIDÆ.

CEDAR CREEK, a small stream which rises in Shenandoah co., Va., and with a general south-easterly course empties into the north fork of the Shenandoah River about 3 miles east of Strasburg, a station on the Winchester and Strasburg Railroad, 46 miles south-west of Harper's Ferry. On this stream was fought a very severe battle between the Federal troops under Gens. Wright and Sheridan and a Confederate force under Gen. Early, Oct. 19, 1864. The Shenandoah Valley was of great importance to the Confederates, not only on account of its rich harvests, but also of the facility with which they could threaten Washington and make incursions upon Pennsylvania and Maryland. Such diversions had often temporarily fettered the movements of the Army of the Potomac. To put an end to these troubles, Gen. Grant, then besieging Petersburg, had united the departments of West Virginia, Washington, and Shenandoah into the middle military division, and on the 7th of Aug., 1864, had appointed Gen. P. H. Sheridan to the command—a young officer whose judgment, skill, and valor had been displayed in many actions. The Union force under his orders consisted of the Sixth and Nineteenth corps, the infantry and cavalry of West Virginia, constituting the Eighth corps, and two divisions of cavalry under Torbert and Wilson, with Custer and Merritt as brigade commanders. There were in all 40,000 men, of whom 10,000 were cavalry. Sheridan was for some time kept by Grant upon the defensive, but after a personal interview the general-in-chief allowed him to undertake offensive operations. He at once vindicated the confidence reposed in him. He defeated Early on a line running along the Opequan Creek to Winchester on the 19th of September, pursued him 30 miles, and two days after again routed him at Fisher's Hill, where he had made a stand, and sent him flying up the valley. Then, laying waste the entire region south of Strasburg, destroying all the grain he could not use, burning barns and mills, and driving before him many thousand head of cattle, Sheridan returned and posted his army behind Cedar Creek on separate ridges in rear of the east bank. The following was the arrangement of his troops: Crook, with the Eighth corps, occupied the advance and left of the line; Emory, with the Nineteenth, the centre, about half a mile in rear; on the right and somewhat retired was the Sixth corps

(Wright's, temporarily commanded by Ricketts). Averill's cavalry was on the left flank, while Custer and Merritt guarded the right. Gen. H. G. Wright was left in temporary command of the whole, Sheridan having been called to Washington. Recovering from his defeats, and burning to retrieve them, Early now contemplated a surprise which came near resulting in a crowning victory. He had received a reinforcement of 12,000 men, raising his force to about 27,000. With them on the 18th of October he crossed the mountain separating the two branches of the Shenandoah, forded the north fork, and before day on the 19th, aided by the darkness and a dense fog, his advance columns lay within 600 yards of the sleeping Federal troops. He prepared a feint attack upon the Union right, and the left was simultaneously awakened by the rush and shouts of the Confederates. It was a complete surprise. Crook's West Virginia corps was rolled back and thrown into wild confusion. Meanwhile, another column advanced to the attack of Emory's Nineteenth corps, which was driven back in disorder. Ricketts, with the Sixth, changed front to the left to cover the retreat which was sweeping past him, when a column of the enemy tried to cut him off. Wright ordered Custer and Merritt from the right to the left flank to aid in protecting the retreat which he now ordered. Federal fugitives were now strewing the valley all the way to Winchester. Wright endeavored to make a stand and form a new line at Middletown, but there was not cohesion enough in the retreating masses to accomplish this. At last they were well in hand at a point between Middletown and Newtown, and here Wright succeeded in forming a strong line, not only for defence, but for again assuming the offensive. Such was the condition of things, and the disaster had been measurably repaired, when Sheridan came upon the field and resumed the command. He had slept at Winchester, 20 miles distant, but had started early in the morning, when he heard the sounds of battle, and, riding at full speed, arrived at half-past ten o'clock. His appearance and his words soon inspired new confidence; he turned back the retreating troops, and rode along the entire line to see the positions. He returned the cavalry of Custer from the left to the right, easily repelled an attack upon the Nineteenth corps, and at three o'clock ordered a countercharge along the whole line, the cavalry falling upon the Confederate flanks. Early's troops had many of them scattered to gather the spoils of the captured Federal camp, and his army was thus somewhat disorganized. They were driven back and put to rout, pursued by the Union army to their old camps, and then by the cavalry up the valley far beyond Strasburg, until nightfall. Never was a lost battle more handsomely retrieved. All the guns Early had captured in the morning, and twenty-three more, were taken, making forty-nine in all. The Confederate loss was 3000 in killed and wounded, 1500 prisoners, 50 wagons, 65 ambulances, and 1600 small-arms. The Federal loss was 3800 killed, wounded, and prisoners.

The results of the battle were of still greater importance. The Shenandoah Valley was for ever cleared of Confederate armies. The Sixth corps was sent to aid Gen. Grant in the operations in front of Petersburg, and two other divisions, principally of cavalry, were detached, one to the Army of the James, and the other to Savannah to guard the captures made by Sherman. On the 8th of November, Brig.-Gen. Sheridan was appointed by the President a major-general in the U. S. army "for personal gallantry, military skill, and just confidence in the courage and patriotism of his troops, . . . and a brilliant victory achieved over the rebels for the third time in pitched battle within thirty days." (H. C.)

CEDAR FALLS, a city of Black Hawk co., Iowa, is on the W. bank of Cedar River and on the Iowa division of the Illinois Central Railroad, near the junction of the Cedar Falls and Minnesota branch road, 99 miles W. of Dubuque. There is a railroad bridge across the river. The town has four banks (one national), a weekly newspaper, a public library, a State normal school and graded schools, eight churches, and well-shaded streets. It has good water-power, which is used in three large flour-mills, two grist-mills, an oat-mill, woollen-mill, paper-mill, pump and lightning-rod manufactory, and other industries. It was settled in 1845. Population, 3591.

CEDAR RAPIDS, a city of Linn co., Iowa, is on both sides of Cedar River, which is crossed here by five bridges. It is 219 miles W. of Chicago and 79 miles S. W. of Dubuque, on the Chicago, Milwaukee, and St. Paul Railroad, the Chicago and North-western Railroad, and the Burlington, Cedar Rapids, and Northern Railroad. The offices and car-works of the latter road are in this town. It has four banks, two prosperous insurance companies, an opera-house which cost $100,000, four hotels, one daily and seven weekly newspapers (one German), and a monthly agricultural paper, a public library, twenty churches, a good system of public schools, and is the seat of Coe College, a Presbyterian institution. It has gas- and water-works, fire-alarm telegraph, an active board of trade, and the city debt is only $35,000. It has a large packing-house, in which 600 hands are employed and 350,000 hogs are slaughtered annually. The wholesale trade, carried on by twenty-five jobbing-houses and employing fifty salesmen, amounts annually to $3,000,000. Having the most extensive water-power in Iowa, it is an important manufacturing town, with investments of $2,000,000, employing 1500 hands and producing annually goods valued at $7,000,000. The chief manufactures are machinery, agricultural implements, and carriages. The country around is noted for its dairy products. The city was chartered in 1856, and has grown rapidly in recent years. Population, 17,977.

CELLS, ORGANIC: THEIR STRUCTURE AND DEVELOPMENT. Important discoveries have been made in recent years concerning the organic cell, which greatly extend our knowledge of its formation and changes. These discoveries are due partly to improvements in apparatus, but more particularly to the improved methods of preparing and mounting organic sections for microscopic observation. By these means a much clearer insight into the details of organic structure has been attained. The subject, it is true, is as yet only partly elucidated, and much difference of opinion prevails concerning minor points; but there is little doubt entertained in regard to its main features.

The history of scientific opinion with regard to the organic cell as the unit of vegetable and animal structure has been a greatly diversified one. But it was for many years supposed to be established that the cell consisted of a microscopic mass of albuminous matter or *protoplasm*, usually surrounded by a membrane, generally containing minute granules, having in its centre a nucleus of denser protoplasm. The nucleus usually contains a smaller mass called the *nucleolus*, though occasionally both seem absent. In its division this body

seemed to be constricted equatorially, the constriction always passing through the nucleus and separating the original cell into two new ones. Recently, however, it has been discovered that the structure and division of the cell have none of the simplicity here indicated. The cell, instead of nearly being homogeneous and structureless, is really penetrated by numerous delicate fibres. These are specially present in the nucleus, which seems the active region of the cellular mass. They are not seen in the nucleolus. Some observers believe that the nucleolus and the granules are merely nodal points of the inosculating fibres, but the balance of opinion is in favor of the separate existence of the nucleolus. The intervening spaces of the fibrous network are filled with a homogeneous ground substance. It is a question whether the granules seen belong to this substance or are optical illusions. In the division of the cell its reticulated fibres pass through some particular transformations, which we will briefly epitomize. The process has been given the name of *karyokinesis*. Flemming thus describes this process, as seen by him in the cells of *Salamandra:* The cell displays periodical changes, passing from a quiescent to an active state, and the reverse. In the former, known as the resting stage, the nucleus consists of a faintly defined reticulum of fibrils whose meshes hold a homogeneous ground substance. One or more nucleoli and a few small granules are usually present. When treated with staining reagents during this stage the whole substance of the nucleus equally takes the stain. But during the whole active stage only the fibres take the stain, while the ground substance remains clear and transparent. From this difference of behavior it is argued that the cell-contents consist of two distinct substances, which are mingled in the resting stage, but become separated in the active stage. The stain-taking substance has been named *chromatin;* the unstained ground substance, *achromatin*.

When the active stage commences the membrane of the nucleus disappears; the nucleolus and granules also vanish. The fibrils lose their net-like arrangement, and become an irregular convolution, with no visible free ends. Around this fibrous mass appears a clear space, which separates it from the outer cell-substance. The nucleus in this state has been named the *aster*.

In the succeeding changes the fibrous convolutions first assume a wreath-like arrangement, with its bends irregularly directed towards the centre. Next, the wreath loses its continuity, and breaks up into a series of short, separate fibres, which form V-shaped loops. The bends of the loops are directed towards the central space, their openings outwardly. This arrangement forms the *mother star*. Various vaguely defined movements follow, in which the looped fibres are compressed towards the equatorial plane of the nucleus, separate into two masses with this plane between them, and turn until their bends are directed outward, their openings inward. If we view the cell as a globe divided into two hemispheres by an equatorial plane, then on each side of this circular plane will appear a smaller circle of fibrous loops, so arranged as to present something of the aspect of a circular basket. The converging, looped ends of the fibres are turned outward; the diverging, open ends are directed inward and face each other.

In the next stage of the process the basket-like figures recede from each other in the axial line of the cell until they reach the polar regions of the nucleus. Here the V-shaped loops re-arrange themselves, their bends again being directed towards a central space. The two new figures thus formed resemble that of the *mother star*, and are called *daughter stars*, the whole new arrangement of the nucleus being known as the *dyaster*. Thus a centralized arrangement of the fibrous nuclear contents and their separation into two oppositely placed masses are the primary steps in cell-division.

As the basket-like figures recede toward the poles, delicate striæ often appear in the interval between them and stretch from pole to pole across the equator. They form what is known as the *nuclear spindle*. They are most declared in vegetable cells and in segmenting ova, where similar faint lines often radiate from the poles towards the outer cell-surface, forming sun-like figures at each end of the spindle. The final division of the cell is preceded by the appearance of a row of dots across the equatorial plane, which appearance is probably caused by thickenings of the lines in the centre of the spindle. The lines of the spindle seem to be composed of achromatin, while these thickenings are apparently chromatin. They form what is called the *equatorial plate*. They soon divide, the lines of the spindle parting in the middle and the single row of dots giving rise to a double row, which appear like minute disks at the ends of the nuclear striæ. Thus a double equatorial plate is formed, enclosing a narrow equatorial plane. It is in this plane that cell-division takes place. A furrow appears around the exterior surface of the cell, which extends inward between the equatorial plates, and deepens until it reaches the centre. By this deepening constriction the cell is quickly divided into two new ones. Meanwhile new nuclei are forming at the poles of the spindle. The ends of the loops of the daughter stars unite and form a wreath-like figure. The bends of this figure change their positions until an irregular convolution is produced. This quickly assumes the reticular structure. Membranes form around the new nuclei. Nucleoli and granules reappear. The resting stage is regained. Thus by a process exactly reverse to that in which the original cell left its resting stage two new cells return to the resting stage.

Such is Flemming's typical case of cell-division. Other observers describe a process somewhat similar, though less regular in its details. There is a diversity of opinion about several points, which perhaps partly arises from there being a real difference in the behavior of cells from different sources.

We have spoken of the unsettled questions concerning the real or illusory existence of the nucleoli and the granules. It is also questioned whether or not the outer cell-substance is like the nucleus in structure. Klein holds that it is. Flemming has lately announced the discovery in the resting nucleus of a very fine network in connection with the coarser one previously known. He also declares that the nuclear membrane is really composed of minute flat plates of chromatin continuous with the fibrils of the network. These are separated by slight intervals, so that the membrane appears to be pierced with holes which are possibly occupied by the transparent ground substance. Others deny the existence of a nuclear membrane. Dr. Pfitzner has recently declared that the chromatin fibrils are not homogeneous in structure, [illegible] they really consist of minute spherules of ch[illegible] connected by some other substance, probably [illegible]

These observations point to a possi[illegible]uti[illegible] disputed questions. The ch[illegible] bly the active element—of the [illegible] first regularly arranged around the [illegible] divides in the plane of the equator,

poles to form the nuclei of new cells. As it recedes, achromatin fibrils appear, which, if Pfitzner's observation prove correct, may be the bared basal lines of the fibres after their chromatin has gathered at the poles. The disks of the equatorial plate may also be a portion of this chromatin which has remained in the centre of the spindle. And if Flemming's last-mentioned observation be confirmed, it will indicate that the fibrils of the nucleus resemble those of the nuclear spindle in having chromatin disks at their extremities, laid side by side over the surface of the nucleus. During the resting stage, however, this localization of the chromatin at centre and surface is apparently lost. It seemingly becomes diffused throughout the nucleus, as is indicated by all the substance of the latter now taking the stain.

In the other forms of cell-division probably similar phenomena occur. We know that they do in one instance of cell-budding, that by which the polar bodies of the animal ovum are formed. In this case a nuclear spindle is formed centrally, then moves to the side of the cell and protrudes one pole through the cell-membrane. This is constricted off to form the polar body. If completely separated it would probably represent a free bud. The remaining pole of the spindle returns to the centre of the cell and resumes the nuclear condition. The process resembles ordinary cell-division in all particulars, with the exception that the two new cells differ greatly in size.

The division of the vegetable cell fails to display the well-marked changes above described, yet it presents other features not seen in the animal cell. Instead of definite movements of chromatin fibrils, there are vague motions of the cell-protoplasm which distantly resemble those described. As Strasburger details the process, it begins with a massing of the contents of the nucleus in its equatorial region. It assumes a spindle shape, with this dark mass placed centrally and clear areas extending to its poles. He calls the central mass the *nuclear plate*. It soon splits, and its two halves retreat to the poles. In many plant-cells this preliminary phase of division is not apparent. The remainder of the process we give as recently described by J. M. Macfarlane from observations on the cells of *Spirogyra*: Division of these cells begins with an aggregation, on opposite sides of the nucleus, in a line with the long axis of the cell, of a quantity of pale, slightly granular protoplasm. In the interior of the nucleus a mass of darker protoplasm soon appears at either pole, though there is no evidence that these masses come from the centre, as in the cases described by Strasburger. These polar masses push through the membrane of the nucleus, and combine with the outer aggregations of pale protoplasm to form two dark, amœboid lumps. From these polar masses fibres run inward and outward.

The cells of *Spirogyra* contain a large and well-defined nucleolus, which apparently possesses a smaller interior body, called by Mr. Macfarlane the *nucleolo-nucleus*. These bodies take part in the division process. The nucleolus swells and the nucleolo-nucleus divides
) two. In the next stage the nuclear membrane
e and a spindle of fibres, running inward
; o the nucleolus and bordered by dark-
run from pole to pole, appears. This
barrel. Next the nucleolus
move toward the poles. At
barrel lengthens and widens,
acted from the centre. In
time the nucleoli reach the polar masses, and penetrate them. Thus are formed the rudiments of new nuclei. As the nucleoli recede, fibres extend between them, until there is formed a figure resembling the nuclear spindle already described. The remaining process is like that of the animal cell. An *equatorial plate* is formed and divides into two, between which there pushes in from the cell-membrane a wall of cellulose. This thickens and deepens until it reaches the centre, and forms the dividing-wall of the two new cells. The swelled-out lines of the nuclear spindle contract, but they continue visible after the division is accomplished. The polar masses secrete new membranes, and assume the condition of nuclei of the new cells.

This process of division seems analogous to, though not identical with, that of the animal cell. Perhaps it is a more primitive mode. In it the nucleolus appears to play an important part, while in the animal cell the nucleolus seems unimportant. On the other hand, the transformations of the fibrous network seem much more declared in animal than in vegetable cells. Apparently, in animal tissues the cell-fibres attain a more developed condition than that above indicated. They extend, in certain cases, beyond the superficies of the cell and connect it with adjoining cells. This condition has been observed in epithelial cells. Heitzmann declares that it exists in all cells, and that in many tissues the cell-structure disappears, and only central nuclei persist, from which outreach long, inosculating fibres of protoplasm, combining the whole body into a living network. This announcement, however, is questioned.

Yet in certain tissues this fibrous outgrowth of cell-structure is undeniably present. It exists in the cells of nerve-ganglia as delicate hairs or rootlets. These are probably prolongations of the inter-cell fibrils, and they appear to form the gangliar termination of the sensory nerves, being gathered into fibrous bundles and surrounded by a medullary sheath. The motor nerves, on the contrary, appear to leave the cells as distinct, single fibres. In the outward terminations of the nerve-fibres there are indications of a similar continuation with cell-fibrils. The delicate endings of the nerves enter cell-like structures in many of the sensory nerve-endings. In the muscle terminations of the motor nerves a similar condition appears. Gerlach asserts that in the voluntary or striped muscles the nerve ends in minute fibrils, which penetrate the muscle-cells. In the unstriped muscles the nerves subdivide to form a very delicate intra-muscular network. Frankenhauser traced minute fibrils from this network into the substance of the muscle-cell, ending, as he believed, in its nucleolus. But Arnold asserts that a filament is continuous through the cell and rejoins the network without. Thus the cell-nucleus, or nucleolus, seems to be the nodal point of a fine intra-muscular network of nerve-fibrils.

These facts seem to show an intimate relation between the cell-fibril and the nerve-fibre, and indicate that the former is the primitive form of the latter. In the evolution of animal structure it is possible that the cell-fibril became prolonged beyond the cell-surface, possibly serving as a sensitive prolongation, and eventually developed into the nerve, which in the higher animals is the connecting link between cell-masses, and particularly between the muscular, the epithelial, and the ganglionic organs of the body. This view is hypothetical, yet it points in the direction to which discovery seems tending. Certainly, the fibre, as an element of

cell and of animal structure, is growing into greater importance with every new advance in microscopic discovery. (C. M.)

CELLULOID, an artificial material used in the arts as a substitute for ivory, horn, amber, and other natural products. Materials resembling celluloid have been made under various names since 1855, both in Europe and the United States. All the methods of making it, whether it is called parkesine, xylonine, or celluloid, are essentially the same. Cotton or other vegetable fibre is treated first with acids to produce pyroxyline, and this is treated with camphor and other solvents to produce a solid elastic substance that resembles ivory. None of the experiments appear to have been commercially successful until 1869. In that year J. W. Hyatt, Jr., and I. S. Hyatt obtained a patent on an improved method of treating pyroxyline, and soon after the name "celluloid" was applied to the material as now manufactured. Since that time over ninety patents have been obtained on the applications of celluloid, the process of making it, and the machinery used in its manufacture. All the celluloid produced in the United States is made by one company, and in Newark, N. J. The celluloid used in Europe is made by an associate company at Paris. All the processes are patented, and the details of the manufacture are held as trade secrets. The quality of the material has been steadily improved and its cost greatly reduced. This has led to its general introduction, and it is now used in large quantities in nearly every trade. The basis of celluloid is a fine quality of tissue-paper submitted to the action of sulphuric and nitric acids. The solvents and coloring-matter are added to the pyroxyline under the influence of steam heat and pressure. It can be moulded into any form by steam ranging in temperature from 212° to 300° Fahr., and can be planed or turned into thin sheets when cold.

In appearance, crude or uncolored celluloid is of a pale yellow color both by reflected and transmitted light, and in thin sheets is quite transparent. It resists hot and cold water and the more common acids and alkalies. It can, however, be dissolved in strong alcohol or spirits of camphor. Celluloid is hard, tough, elastic, and slightly heavier than water. It burns freely with a bright flame and black smoke, and leaves a white ash showing a fibrous character. It can be polished, sawn, turned, carved, and planed, and is plastic under heat and pressure. The addition of coloring-materials causes it to resemble parchment, jet, shell, ivory, bone, tortoise-shell, agate, coral, amber, malachite, and other natural products. It is much stronger than some of these, and lighter and less liable to warp and split or tarnish under the influence of the atmosphere. The colors are permanent, and the material is more durable than the natural substances it is designed to replace. It is stronger than hard rubber, though somewhat more costly.

Celluloid was first used as a substitute for ivory in making billiard-balls. Its many valuable properties quickly led to other uses, and it is now used in place of horn, shell, bone, amber, wood, paper, and glass. It is used in making imitation jewelry, piano-keys, knife, mirror, brush, and umbrella handles, harness trimmings, rulers, chessmen, and parts of musical, dental, and photographic instruments and apparatus. Its lightness, cleanliness, and readiness to take color and polish led to its introduction as a substitute for linen in cuffs and collars, and it is largely used for this purpose. By the latest methods of manufacture linen is covered on both sides with a transparent film of celluloid, and the finished goods have all the appearance of linen. Celluloid is also used as a basis for emery-wheels and a foundation for pearl and other buttons. (C. R.)

CEMETERIES IN AMERICA. The present mode of disposing of the remains of the dead in the United States is, with few exceptions, inhumation, or committing the bodies to the earth. Comparatively few are placed in vaults, catacombs, or brick graves, while a still less, and quite inconsidcrable, number are disposed of by incineration, although great efforts have been made during the past decade to introduce cremation in America as well as in Europe.

See Vol. V. p. 286 Am. ed. (p. 226 Edin. ed.).

Cemeteries in America are conducted on various plans. A number of these are under the control of city authorities, while others are the property of religious communities. The largest and most successfully managed of these institutions are, however, those established by private enterprise, where every owner of a family burial-plot is a member of the corporation, and where the entire income is devoted to the improvement and perpetual care of the grounds.

While large European cities have thousands of acres devoted to splendid public parks, none has a rural cemetery that will compare with those near Boston, Philadelphia, New York, or Cincinnati. During the past quarter of this century the American cemeteries have justly gained the reputation of being the most beautiful in the world. The practice of substituting the creations of the art of landscape-gardening for the bleak and neglected aspect of a mere graveyard was adopted in America about the same time as it began to obtain in England.

We shall here mention briefly the principal cemeteries of the United States and Canada.

New England.—Mount Auburn Cemetery, near the city of Boston, was established in 1831, and is, consequently, the first rural cemetery of any importance on the American continent. It contains an area of 125 acres of native woodland, with (at this time) over 23,000 interments. The principal eminence of this area, which is crowned with a round tower 62 feet in height and built of smooth hammered granite, serves as a landmark by which this cemetery can be identified from a great distance, and commands one of the finest prospects in the environs of Boston. The large number of costly monuments erected on individual lots shows the interest which the people of Boston take in their pioneer cemetery. The largest cemetery, however, in the vicinity of Boston is Forest Hills, established in 1848. It contains over 200 acres of beautifully situated grounds, with over 18,000 interments up to this time. Woodland Cemetery contains 100 acres, and was dedicated as a place of burial in 1851. Cedar Grove and Mount Hope cemeteries are under the care of the city authorities, the former containing 40 acres and the latter 100 acres. The Newton Cemetery is also situated near Boston. It contains 80 acres, and was established in 1860.

Cedar Hill Cemetery is located about 3 miles from the city of Hartford, Conn. The grounds were laid out by Jacob Weidenmann in 1865, and consecrated to burial purposes in 1868. It contains an area of 254 acres of beautifully situated grounds. Many substantial and tasteful improvements have been made by the corporation as well as by the owners of lots.

Swan Point Cemetery, near the city of Providence,

R. I., was incorporated in 1858, and contains an area of 250 acres of undulating and diversified grounds, with many beautiful improvements.

Evergreen Cemetery, at New Haven, Conn., was dedicated in 1849, and contains about 40 acres.

New York.—Greenwood Cemetery, on Long Island, near Brooklyn, was incorporated in 1838, but no interment was made till 1842. The grounds comprise 450 acres, and over 210,000 interments have been made within its precincts. In natural beauty, elaborate improvements, and costly monuments it is the first cemetery in the United States. Twenty miles of avenues and seventeen miles of footpaths have been constructed, and over 45,000 monuments and headstones have been erected to the memory of the dead. This cemetery has five entrances. The northern or main entrance is built of New Jersey freestone, and is 132 feet long by 40 feet in depth, with a central pinnacle 106 feet in height. The office-buildings are connected with this entrance. The most noted monuments to be seen here are the Firemen's, the Soldiers', the Pilots', De Witt Clinton's, Horace Greeley's, etc. Magnificent views can be had from these grounds, including the metropolis, New York harbor and bay, and the ocean beyond.

Woodlawn Cemetery, situated on the Harlem Railroad near the junction of the New York and New Haven Railroad, contains 400 acres. Since the date of its organization (1863) there have been, up to this time, over 18,000 interments. The improvements on these grounds are chiefly made in accordance with the park or lawn plan. The grounds, like most of the other burial-places in the United States, are exempted from assessment and public taxes. Cypress Hill Cemetery is located on Long Island, and comprises nearly 400 acres. This cemetery was dedicated in 1848, and by its charter is permitted to hold 500 acres of grounds. Over 110,000 interments have been made since its organization. Evergreen Cemetery is situated about 3 miles from Brooklyn. It was opened for burial purposes in 1851, and contains 340 acres, with over 66,000 interments. Calvary Cemetery is the principal Roman Catholic cemetery in the vicinity of New York, and over 400,000 bodies have been interred therein since it was opened in 1848. The grounds cover an area of more than 100 acres, and are divided into ten sections. The Soldiers' Monument, erected by the city of New York in 1866, is a conspicuous feature of this cemetery. The Lutheran Cemetery was established in 1852 by the united Lutheran churches of New York, and over 100,000 interments have been made since its dedication. The cemetery company holds 400 acres of ground for burial purposes, one-half of which is already improved. There are many smaller cemeteries in the vicinity.

Near the city of Albany there is an extensive rural cemetery, with over 24,000 interments. On the Hudson River, near the city of Troy, is situated one of the largest and best-kept cemeteries of the State, known as Oakwood Cemetery. Forest Lawn Cemetery is situated near the city of Buffalo. It was dedicated in 1850, and contains an area of 250 acres, covered with large forest trees. Mount Hope Cemetery, near Rochester, was established in 1845, and is situated near the southern part of the city. Forest Hills Cemetery, near Utica, is also worthy of mention. The most noted improvement on these grounds is the conservatory chapel, which is used for funeral services in inclement weather.

Pennsylvania.—In 1836, John Jay Smith, in company with a few other enterprising citizens of Philadelphia, laid out on the banks of the Schuylkill the now far-famed Laurel Hill Cemetery, which contains about 80 acres. It was then 3 miles N. of the city, but is now within the city limits, though not yet approached by buildings. The same company in 1869 established West Laurel Hill, which contains over 200 acres of still more beautifully situated grounds, and, like the other, has proved very attractive. Both contain a large number of elegant monuments. Mount Peace and Mount Vernon cemeteries, immediately adjoining Laurel Hill Cemetery, are also handsomely improved. Woodlands Cemetery is on the W. bank of the Schuylkill, and was laid out in 1851. Mount Moriah Cemetery, south-west of the city, has good grounds which are steadily improved.

Allegheny Cemetery, situated near the city of Pittsburg, is the largest rural cemetery in the State of Pennsylvania. It was established in 1845, and contains 360 acres. The improvements on the grounds are made much after the style of the older cemeteries near the Eastern cities. The view presented to the eye of the beholder in all directions from the highest point in this cemetery is surpassingly beautiful, including the Allegheny and Monongahela rivers.

New Jersey.—Fairmount Cemetery, near Newark, is probably the best known burial-place in this State. It was incorporated in 1855, and contains about 60 acres of dry and sandy soil.

Southern States.—Green Mount Cemetery, near the city of Baltimore, was dedicated in 1839. The principal improvement on these grounds is the chapel, constructed of brown sandstone at a cost of $30,000.

Oak Hill Cemetery is situated at Georgetown, D. C., about 2 miles from Washington City, and was incorporated in 1849. The grounds contain an area of 35 acres, and are the best kept in the vicinity of the national capital. Many beautiful monuments have been erected within its borders, also a Gothic chapel for funeral services.

Hollywood Cemetery, at Richmond, Va., has been used as a burial-place since 1847, and contains at this time an area of 95 acres of undulating surface, well covered with native forest trees. The name Hollywood is due to the prevalence of the holly trees which grow here to great perfection. The *Magnolia grandiflora* also flourishes here, and contributes much to the beauty of the landscape. In these grounds over 20,000 interments have been made.

Magnolia Cemetery, just N. of Charleston, S. C., is the finest in that vicinity, though many distinguished citizens are buried in the graveyard attached to St. Philip's Church in the city.

Bonaventure Cemetery is situated on a branch of the Savannah River, about 4 miles from the city of Savannah, Ga. One hundred years ago it was the country-seat of a wealthy gentleman, and was laid out with wide avenues and planted with native live-oaks. It has since become the burial-place of the prominent families of Savannah, whose memorial monuments add to its solemn beauty.

The cemeteries of New Orleans are especially notable. Owing to the very moist nature of the soil the tombs are placed above ground; most of them are structures about 8 feet high, consisting of cells just large enough to admit a coffin. After the funeral cermonies are performed the opening is bricked up, and generally a marble tablet with appropriate inscription is placed over the vault. Some of the tombs are elaborate structures of marble. The cemeteries beyond the city limits are beautiful with the magnolia, cypress, and willow trees,

as well as abundance of flowers. On All Saints' and All Souls' Days (Nov. 1 and 2) the people of New Orleans visit the cemeteries and deck the tombs with flowers, immortelles, and other tokens of remembrance.

Elmwood Cemetery is probably the best known burial-ground in the State of Tennessee. It is situated near the city of Memphis, was incorporated in 1852, and contains about 80 acres of woodland, chiefly oak and elm. Mount Olivet Cemetery is situated near Nashville, and is the next largest cemetery in that State.

Cave Hill Cemetery, near Louisville, is the largest and best kept cemetery in the State of Kentucky. It was incorporated in 1845, and contains over 200 acres of well-improved grounds. Individual burial-lots are, in most instances, surrounded by low stone walls. The cities of Frankfort and Lexington in the same State have also large and well-kept cemeteries.

Ohio.—Spring Grove Cemetery, near Cincinnati, was opened for burial purposes in 1845. It now contains an area of 600 acres, and is therefore the largest cemetery in America. The original plan of improvement was made by the late John Notman, much after the style of Laurel Hill Cemetery at Philadelphia, of which he was also the designer. Since 1854 the improvements have been conducted on a new plan, known under the name of the "park system," introduced by A. Strauch. The numerous springs and ancient groves of trees suggested the name of Spring Grove. Although surpassed in the costliness of her monuments by many other cemeteries, yet to the lover of nature Spring Grove is more delightful and satisfactory. Its undulations of green turf, its broad avenues, and its rare and stately trees unite the elegance of a park with the pensive beauty of a burial-place.

Lake View Cemetery, situated near the city of Cleveland, is the next largest burial-place in the State of Ohio. It was laid out in 1870, and contains the remains of President Garfield. This cemetery takes its name from the beautiful views obtained of Lake Erie from its highest point. Riverside Cemetery is also located near this city, and was dedicated in 1875. Woodlawn Cemetery is situated near the city of Toledo, and is of still more recent origin.

Indiana.—Crown Hill Cemetery, near the city of Indianapolis, is the largest and best-kept cemetery in Indiana. It was dedicated as a burial-place in 1863, and contains an area of 360 acres of mostly level ground.

Missouri.—Bello Fontaine Cemetery is situated near the city of St. Louis. It contains an area of 332 acres of beautiful woodland, chiefly oak. It was established in 1849, and is the largest and best-known cemetery in the State of Missouri.

Michigan.—Near the city of Detroit is Woodmere Cemetery, which was established in 1869, and contains an area of 200 acres of grounds well adapted to the purposes for which they have been consecrated.

Illinois.—In the environs of Chicago we find three large rural cemeteries. Rose Hill Cemetery, established in 1859, is situated on the Milwaukee division of the Chicago and North-western Railroad, and contains about 250 acres. Graceland Cemetery, fronting on the Green Bay road, was incorporated in 1861. Oakwood Cemetery was established in 1864, and contains about 300 acres. It is situated on Cottage Grove Avenue. Oak Ridge Cemetery is situated near the city of Springfield. It was consecrated in 1860, and contains 75 acres of woodland. In these grounds is the mausoleum containing the remains of the martyred President, Abraham Lincoln.

Wisconsin.—Forest Home Cemetery, situated near the city of Milwaukee, contains an area of 200 acres. These grounds are laid out with great taste and skill, and are approached by a wide avenue.

California.—Lone Mountain Cemetery was the original burial-place in the vicinity of San Francisco, and is in many respects unsurpassed for splendid location, particularly in the beautiful views over the city, bay and ocean. Mountain View Cemetery is situated near Oakland, and was laid out by Fred. Law Olmsted in 1865. It is a burial-place for Protestants, Catholics, and Hebrews. Laurel Hill Cemetery is another of the principal burial-places in the vicinity of the Golden Gate City.

Canada.—Mount Royal Cemetery is at this time the largest and best-kept rural burial-place in the Dominion of Canada. Situated about 2 miles from the city of Montreal, it contains an area of 217 acres of beautifully undulating grounds. This cemetery was established in 1851, and over 22,000 interments have been made within its boundaries since that time. Many substantial improvements have been made on private burial-lots; most of them, however, are surrounded with various kinds of enclosures, as was formerly the case in the older cemeteries in the United States. The buildings at the entrance to these grounds contain the residence of the superintendent, also rooms for the transaction of the business of the cemetery and the accommodation of visitors. One large room is also provided for occasional funeral services. In consequence of the extreme cold weather during the winter months the remains of the dead are deposited in two spacious public vaults situated a short distance from the entrance, where they remain until spring.

Mount Hermon Cemetery is situated about 3 miles from the city of Quebec. It was chartered in 1848, and contains 35 acres, with over 6000 interments. Many private lots are adorned with costly monuments and tombs. As is the case in Montreal, the dead are here also deposited in a vault during the winter, awaiting final interment in the spring.

Nearly all of the public places to which we have referred, usually termed rural or garden cemeteries, are very favorably situated and well managed. A large number of them are, however, sadly disfigured by objects that should find no place among the homes of the dead. Permitting owners of lots to enclose their burial-plats separately, either with wood, stone, iron, or hedge fences; to erect as many tombstones therein as they please; to plant, indiscriminately, all sorts of trees, shrubs, and flowers, and otherwise encumber the graves of their dead with varieties of objects and puerile ornamentation,—has cost many cemetery associations large sums of money, besides defacing and destroying their otherwise beautiful grounds. This style of promiscuous and tasteless decoration of the resting-places of the dead is also very much calculated to pervert taste and imbue the minds of the people with false ideas. To escape these defects in the adornment of our rural cemeteries, the board of directors of Spring Grove Cemetery, near Cincinnati, in 1856, at the suggestion of Adolph Strauch, recommended to the owners of lots certain reforms, which, although at first much opposed, have since been gradually carried into effect, not only in Spring Grove, but also in several other cemeteries throughout the country. The object of these reforms is to reconcile the essential requirements of a rural

burial-place with true landscape art, and thus to realize as far as possible the ideal of a rural cemetery. The suggestions of Mr. Strauch were these:

1. No individual burial-lot should be enclosed by any kind of fence, but proper landmarks should be substituted, bearing the name of the owner and the number of the lot thereon, to be placed at each corner of the lot and level with the surrounding grounds.

2. In order to prevent the unsightly crowding of tombstones, which gives many of our best cemeteries the appearance of a stone-cutter's establishment, only one monument may be erected in the centre of each lot, so that the graves of the family can be located around the monument, thus saving the expense of head- and foot-stones to each grave. When, however, grave-marks or index-stones are desired, they are to be placed at the foot of the graves, and not project above the surface of the grounds more than the usual height of the grave-mound (about three or four inches), with the name of the deceased on the top of the stone.

3. The planting of trees and shrubs should be entirely under the control of the cemetery authorities. It was also suggested to reserve all corner lots at the junction of avenues for the planting of deciduous forest trees, in order to overcome the monotony produced by the usual planting of evergreens on burial-lots, thus affording visitors shady locations at proper distances. As most of the cemeteries in the vicinity of the larger cities in the United States contain the remains of persons from various parts of the world, the trees of their respective countries might also, very appropriately, be planted over or near their graves. In the course of time there would thus be formed extensive arboretums, which would be far more attractive as well as instructive to succeeding generations than a collection of dilapidated tombstones.

In Spring Grove Cemetery a number of prominent citizens have planted a memorial tree instead of erecting a monument in the centre of their family burial-lots, and located the graves around the same. Many beautiful specimens of the scarlet, the laurel, and the white oak are found as monumental trees on individual lots. "Among the various productions with which Nature has adorned the surface of the earth," say the eloquent author of *Sylva Britannica* "none awake our sympathies so powerfully as those venerable trees which have stood the lapse of ages, silent witnesses of the successive generations of man, to whose destiny they bear so touching a resemblance alike in their budding, their prime, and their decay." (A. S.)

U. S. National Cemeteries.—In 1850, Congress appropriated $10,000 to provide a cemetery near the city of Mexico for American soldiers who had fallen in battle or died in or near that city, and for the interment of American citizens who might die in Mexico. In the following year two acres of ground were purchased, enclosed, and laid out, about 470 interments being made. Little else was done to this cemetery until recent years. Early in the course of the War for the Union, Congress, responding to the feeling of the people, directed national cemeteries to be provided for soldiers who should die in the service of the country. This direction was repeated at the close of the war, and fully carried out under the supervision of Major-Gen. M. C. Meigs, Q. M. G. Portions of the great battlefields of the war had already been used for the burial of the dead, and these were now enclosed and laid out under general regulations, care being taken to identify and mark the graves as far as possible. In other cases ground was purchased by the Government, and the bodies of Union soldiers were gathered from several fields into one cemetery. Superintendents are appointed to take care of the grounds and show proper attention to visitors. They are selected from among the honorably discharged disabled soldiers. The cemeteries under the exclusive control of the national authorities, besides the one in Mexico City, are chiefly in the Southern States, and are distributed as follows: Virginia, 17; Tennessee, 7; Kentucky, 6; Louisiana, Maryland, Illinois, North Carolina, each 4; Mississippi, Arkansas, Missouri, each 3; District of Columbia, South Carolina, Georgia, Florida, Texas, Kansas, Indiana, New York, Pennsylvania, New Jersey, each 2; West Virginia, Alabama, Iowa, Nebraska, Montana, Indian Territory, each 1; total 82. Those having the most numerous interments are as follows:

Andersonville, Ga.	13,714	Memphis, Tenn.	13,977
Antietam, Md.	4,671	Mound City, Ill.	5,226
Arlington, Va.	16,264	Nashville, Tenn.	16,526
Beaufort, S. C.	9,241	New Berne, N. C.	3,254
Corinth, Miss.	5,716	Pittsburg Landing, Tenn	3,590
Chattanooga, Tenn.	12,962	Poplar Grove, Va.	6,199
Chalmette, La.	12,511	Port Hudson, La.	3,818
Fredericksburg, Va.	15,257	Richmond, Va.	6,542
Gettysburg, Pa.	3,575	Salisbury, N. C.	12,126
Hampton, Va.	5,424	Soldiers' Home, D. C.	5,602
Jefferson Barracks, Mo.	11,490	Stone River, Tenn.	6,145
Little Rock, Ark.	5,602	Vicksburg, Miss.	16,600
Marietta, Ga.	10,151	Winchester, Va.	4,459

The total number of interments is 321,369, including 173,088 known and 148,281 unknown. There are about 6900 known and 1500 unknown civilians, and 6100 known and 3200 unknown Confederates. Of the latter, the greater number are buried at Elmira, N. Y., and at Finn's Point, near Salem, N. J. Deducting these, there are gathered in the national cemeteries the remains of nearly 300,000 men who yielded up their lives in defence of the Government which now guards their last resting-places.

The *Congressional* Cemetery at Washington, D. C., belongs to Christ Church (Episcopalian), Congress having purchased several lots in it to provide a burial-place for members. The first burial was in 1807, and the last permanent one in 1864.

CENSUS. The census of 1890 was the eleventh census taken under the direction of the government of the United States. It was authorized and regulated by an Act of Congress approved March 1, 1889, which required that "a census of the population, wealth, and industry of the United States shall be taken on or for the date June 1, 1890."

See Vol. V. p. 290 Am. ed. (p. 334 Edin. ed.).

The late Hon. S. S. Cox, of New York, who drafted the bill for the census of 1880, prepared the following sketch of its provisions, which were largely followed in preparing the census of 1890.

All censuses of the United States previous to that of 1880 were taken by the aid of the United States marshals. The objections to the performance by the marshals of the functions of Census officers were many and serious, and a new method was devised for the collection of statistics in 1880. The law required that an office to be called the Census Office should be established in the Department of the Interior, and that the chief officer, to be entitled Superintendent of the Census, should be appointed by the President, and be charged, under the direction of the Secretary of the Interior, with the duty of superintending the taking of the census. The Superintendent so chosen was Francis A. Walker, of Massachusetts, who, however, resigned before the completion of the work, and was succeeded by the chief clerk of the office, C. W. Seaton, of Washington, D. C. Subsequently the illness of Mr. Seaton compelled the recall of Mr. Walker, under whom the final compilations were made. The salary of the Superintendent was fixed at $5000 a year, and provision was made for discontinuance of the office upon completion of the work of the census.

The Secretary of the Interior was required, on or before the first day of March, 1880, to designate the number of supervisors of Census (taking the places of the marshals) to be appointed in each State and Territory. It was declared that the total number of supervisors should not exceed one hundred and fifty, and that each should reside in the State or Territory in

which he was to operate. Upon each supervisor devolved the duty of proposing to the Superintendent of the Census the apportionment of his district into subdivisions most convenient for purposes of enumeration; of selecting, with the consent of the Superintendent, suitable persons to make the enumeration; of giving necessary instructions to these persons, and of transmitting to the main office the returns procured by the enumerators. Each supervisor, also, was required to examine the returns critically, and to correct any errors detected by him in the work, whether of omission or commission. The law designated five hundred dollars as the amount that should be paid to each supervisor in compensation for his labor.

The enumerators were charged with the task of visiting each dwelling house and family in each subdivision, of seeking out each individual not connected with a family, and of procuring exact answers to all the questions upon the schedules. Indians not taxed were not counted in the general enumeration of the population, but were looked after by special agents. The enumerators were paid as follows: in subdivisions where the Superintendent deemed such an allowance sufficient the compensation was fixed at two cents for each living inhabitant counted, two cents for each death reported, ten cents for each farm, and fifteen cents for each establishment of productive industry enumerated and returned. No claims for mileage and travelling expenses were allowed in such subdivisions, and the time consumed by the enumerators was not at all considered in estimating their pay. For all other subdivisions the compensation of enumerators was adjusted with reference to the nature of the region canvassed, and the density or sparseness of settlement; but the law expressly declared that "the compensation allowed to any enumerator in any district east of the one-hundredth meridian shall not exceed an average of four dollars a day of ten hours' actual field work, each; and the compensation allowed to any enumerator in any district west of the one-hundredth meridian shall not exceed six dollars a working day of equal length."

It was required that no subdivision should have a population in excess of four thousand, according to the census of 1870, with this exception: that in the States and Territories admitted to the Union since 1870, the Supervisors were allowed to appoint additional enumerators in cases where, in their judgment, the census could not properly be taken in thirty days, by reason either of the increase of population, or of the physical features of the district.

The boundaries of all subdivisions were required to be clearly described by civil divisions, rivers, roads, public surveys, or other lines easy to be distinguished. In accordance with this demand, the Census Office laid down the following rules for the guidance of supervisors in outlining their subdivisions:

1. In no case is a part of one county to be joined in an enumeration district, with another county, or any part thereof.

2. In no case will a town (New England), or township (Middle and Western States generally), or ward of a parish (Louisiana), or militia district (Georgia), or "hundred" (Delaware), or election district, or magisterial district, or precinct, or beat, be joined, in an enumeration district, with a fractional part of another town, or township, or militia district, etc. In the cases (mainly found in the newly settled States) where more than one such civil division is taken to form an enumeration district, the whole of each of such civil division so taken must be included.

3. In general, every town, township, militia district, or other permanent civil division of the county, should be constituted an enumeration district, if the estimated population thereof exceeds seven or eight hundred inhabitants. The only reason which the Census Office could recognize as sufficient for making such a civil division a part of a larger enumeration district, would be the impossibility of securing a competent and trustworthy enumerator within its own limits.

4. The enumeration districts must be made small enough to secure the completion of the canvass within the time set by Congress. To this end, supervisors will be expected to exercise their best judgment in good faith. The number of inhabitants who can be enumerated within the time allowed by the law, will vary greatly according to the geographical conditions of the district and the density or sparseness of settlement. In rich agricultural regions 2000, 2500, or even 3000 inhabitants may safely be embraced in an enumeration district. As settlements become more sparse, and the difficulty of travel increases, a smaller amount of population should be embraced within enumeration districts; for which purpose it will frequently be necessary to divide militia, election, or magisterial districts, beats, precincts, or wards of parishes, in States where the town or township system does not exist; and it may sometimes be found necessary to divide towns and townships to secure prompt enumeration. Wherever this is done, the division should be by some clearly-marked boundary, as a stream or a county road. It is of more importance that the line of demarcation should be clear and unmistakable than that the two districts thus formed should be exactly equal, either in territorial extent or in the amount of population.

5. In cities having over 10,000 inhabitants by the census of 1870, . . . an active, intelligent enumerator can easily take from 200 to 300 names per day, at least after the first day or two. The enumeration districts, therefore, may be safely made to embrace an estimated population of from 2000 to 2500. They should seldom be allowed to exceed the higher number

The Census Office suggested to Supervisors that certain classes of persons might be regarded as having special qualifications for the performance of the duties of enumerators. Township assessors and other local officers were named as likely to make good enumerators, because they are acquainted with the names, residences, occupations, and personal characteristics of the people of their respective townships. Postmasters at small offices, country physicians, and schoolmasters were mentioned as being also well qualified for the work.

The law imposed penalties upon Supervisors and enumerators for neglect of duty, for receiving fees or rewards, and for making false returns; and upon persons over 20 years of age who should refuse to give to the proper officers the information asked for.

It was declared that the work of enumeration for the census of 1880 should begin on the first Monday of June, and should be completed, so far as it related to population, on or before the first day of July next following; but in cities having over ten thousand inhabitants the enumeration was to be completed within two weeks from the first Monday in June. The purpose of the law in this respect was fulfilled, and the census of population was taken in a shorter time than ever before in the history of the country. The only delay that occurred was caused by a recount of the population of the State of South Carolina and of the city of St. Louis, because of complaint that serious injustice

had been done in the first enumeration.

Some facts respecting the time occupied in the enumeration in previous years may be pertinent here. After the taking of the census of 1790, the first United States census, the reports made by the marshals were dated variously from May 4, 1791, to September 19, 1791, excepting that the South Carolina report was dated February 5, 1792. The Secretary of State published his report of the whole, South Carolina excepted, under date of October 24, 1791. The State reports of the census of 1800 vary in date from August, 1800, to December 21, 1801, and the report of the Secretary of State was dated December 8, 1801. The State reports of the census of 1810 were not all returned until 1811. Those of the census of 1820 extended to September 1, 1821, and the Government report was dated December 18, 1821. In 1830, the enumerators began in June, and were allowed until February, 1831, to collect and report their facts. By act of February 3, 1831, this time was extended to August, 1831. The general report was dated January 16, 1832. The general report of 1840 was printed in 1841, the precise date not being ascertainable. The first short summary report of the census of 1850 was made to Congress December 1, 1851. The second was made December 1, 1852, and printed in 1853. The principal report was dated November 10, 1853. The compendium was dated September 1, 1854. The mortality volume was dated November 20, 1855, but the final publications were not made until 1859. The preliminary report of the census of 1860 was dated May 20, 1862. The first large volume, containing the population, was printed in 1864; but the complete publication was delayed until 1866. The law required that the returns of the census of 1870 should be made within one hundred days of the beginning of the enumeration; but this was not the practical result. The last returns came in on August 23, 1871.

There was an intention that the census of 1880 should be made more comprehensive than any that preceded it; and, as a means to this end, the law required that the schedules of inquiries, while conforming generally to those used in the preceding censuses, should be different from them in the following particulars:

Schedule Number One was arranged to contain inquiries as to the relation of each person enumerated to the head of the family, whether wife, son, daughter, servant, boarder, or other; as to the civil conditions of each person enumerated, whether married, widowed, or single; as to the place of birth of each person enumerated; as to all foreign-born, whether alien or naturalized persons; and as to the physical and mental health of each person enumerated, whether active or disabled, maimed, crippled, bedridden, deaf, dumb, blind, insane, or idiotic; and whether employed or unemployed, and if employed, during what portion of the year. It was declared by the law that from this schedule the inquiries as to the value of real and personal estate should be stricken out.

The Superintendent of Census was authorized, with the approval of the Secretary of the Interior, to add to Schedule Number Two, inquiries relating to the acreage of the several crops reported; and, with like approval, to drop from the schedule such of the minor crops as it should be deemed expedient to omit from the enumeration.

Schedule Number Three contained inquiries respecting the kind and amount of power employed in establishments of productive industry, and the kind and number of machines in use, together with the maximum capacity of such establishments, where the Superintendent of Census deemed such inquiry appropriate.

Schedule Number Four contained inquiries relating to the indebtedness of cities, counties, incorporated villages and towns, and school districts; and to the ownership of the public debt of the United States, by whom owned, and the respective amounts. The Superintendent of Census was clothed with power to add to this schedule additional inquiries respecting the ownership of the public debt, as well as the numbers and condition of the pauper and criminal classes.

Schedule Number Five contained inquiries as to the birthplace of the father and mother of each person reported as having died during the year, and as to the usual occupation of each such person.

Special and novel inquiries were made, also, respecting railway companies, telegraph companies, express companies, and companies engaged in marine, fire and life insurance. The purpose of the law was that these should be minute. The following facts were demanded from every railroad corporation or the lessee or receiver thereof: the name of the corporation or company, with the corporate name of all leased lines; the number of miles of road projected or authorized by law or charter, with the several terminal points of the same; the number of miles completed, exhibiting separately the number of lines within each State; the number of miles operated during the last complete fiscal year preceding June 1, 1880; the capital stock allowed by law or charter, and the amount paid up; the amount of funded and unfunded debt, with the period of the funded debt and the rate of interest thereon, and the amount of all sinking funds provided for the redemption of such debts; the number of acres of land, derived from public grants, remaining unsold; the total cost of construction, of equipment, and of all permanent investments, including the cost of purchase of other lines of road, and of telegraph lines; the amount and character of rolling stock; the number and class of employés; the receipts of such corporation or company for the last complete fiscal year preceding June 1, 1880, exhibiting separately the earnings from through freight, from local freight, from passengers, from expresses, and from mails; the expenses of said corporation or company for said fiscal year, exhibiting separately the amount paid for salaries and wages, for fuel, for national, state, and municipal taxes, for interest on bonds and other debts, for dividends, for repairs, for damage to freight, and for personal injuries; also, the operations of the said fiscal year, including the mileage of freight, of passengers, and of construction and repair trains separately; the number of passengers carried, and the amount and class of freight transported each way; also the number, character, and, so far as ascertained, the cause, of all casualties by which life was lost, which occurred on or within the trains, tracks, or buildings of the corporation or company during said fiscal year, and the extent of injury to life and limb resulting therefrom; also, the terms of all agreements and contracts by which sleeping cars, palace or parlor cars, so called, express cars, and cars of transportation companies not identical with the corporation or company making the return required, are run upon such road or roads; and the extent of such service and the amount of all receipts therefrom during the said fiscal year.

From the owners, proprietors, and managers of every incorporated express company the following facts were demanded: the name of the corporation or company; the capital paid up; the total capital stock, and to what extent the same has been watered, and how often "corners" have been made on such watered stock; the length of lines in miles; whether the business was conducted by rail, vessel, or otherwise; the total amount paid to railroads or vessels for the use of line or lines; the number of officers; the number of persons engaged in general administration; the number of agents and messengers; the total receipts, and the total expenditures, exhibiting separately the amounts paid for salaries, for repairs, and for general expenses.

The owners or managers of every telegraph company were required to answer the following inquiries: the name of the corporation or company; the terminal points connected; the authorized capital, and the capital paid up; the length of lines in miles; the miles of wire; the number of officers; the number of persons engaged in general administration; the number of persons engaged as telegraph operators; the number of messages transmitted by officers of the United States government; the number of messages transmitted for the press; the number of messages transmitted for private persons; the total number of messages transmitted; the total receipts from messages; the total expenditures of the company, exhibiting separately the amounts expended for salaries, for repairs, and for general expenses.

The officers and managers of life insurance companies were required to respond to the following inquiries: the name of the company, and the amount of capital and of paid-up capital; the number of persons employed in the general administration; the number employed as agents; the total gross assets of the company, exhibiting separately the realized assets, deferred and unpaid premiums, and premium notes and loans; the total liabilities of the company, exhibiting separately losses adjusted and unadjusted, losses resisted, scrip and other dividends, dividends to policy-holders, not applied, re-insurance fund; all other claims, including capital; receipts from cash premiums, receipts from all other sources; total cash expenditures, exhibiting separately the amount paid for losses and claims, dividends to stockholders, dividends to policy-holders, commissions, officers' salaries, medical examiners' fees, national, state, and local taxation, and all other cash expenditures; the amount and character of deposits in each State to secure policy-holders; premium-note expenditures; the number and amount of policies issued during the year; the number of policies terminating during the year; the number and amount terminated by death, by expiration, by surrender, by lapse, by change; the total number and amount of policies in force, and the amount of the premiums; the amount of losses in cash and notes, and the percentage of loss to the total amount of policies in force; the percentage of assets to the risks in force.

Of every fire and marine insurance company the following facts were demanded: the name of the company; the amount of the capital stock; the amount paid up; the number of persons employed in general administration; the number employed as agents; the gross assets of the company; the total liabilities, exhibiting separately the amount of losses adjusted, losses unadjusted, losses resisted, the re-insurance fund; all other liabilities including capital; also, the total receipts, exhibiting separately fire premiums, marine and inland premiums, and receipts from all other sources, including interest, dividends, and rents; also, the total expenditures, including, separately, the number and amount of fire losses, of marine and inland losses, dividends, commissions, officers' salaries, State, national, and municipal taxes, and all other expenses.

Power was given to the Superintendent of Census to withdraw the schedules for manufacturing and social statistics from the enumerators for the several subdivisions, and to entrust the collection of such statistics to experts and special agents to be employed without respect to locality; and he was permitted to employ such experts and special agents to investigate, in their economic relations, the manufacturing, railroad, fishing, mining, and other industries of the country. In pursuance of this plan, expert special agents, so called, were appointed each to collect statistics for the entire country concerning the following industries and subjects: manufacturing statistics of cities; statistics of the mining industries east of the Mississippi river; statistics of the mining industries west of the Mississippi river; statistics of the fisheries; of meat production; social statistics of cities; statistics of Indians not taxed; of forestry and the lumbering interests; of wealth, debt, and taxation; of power and machinery used in manufactures; of the defective, delinquent, and dependent classes; of the cotton culture; of fire and marine insurance; of schools, churches, and libraries; of orchard fruits, hops, and the manufacture of tobacco; of the manufacture of glass and coke, and wages in manufacturing industry; of the quarrying industry of the United States; of the tobacco culture; vital and monetary statistics; statistics of the silk industry; of the production of cereals; of railroad, transportation, express, and telegraph companies; of Alaska, its population, industry, and resources; of newspapers and the publishing interests; of the movement of petroleum; of the production of petroleum; of the manufacture of iron and steel; of the manufacture of wool; of the chemical manufacturing industry; of the factory system of the United States; of ship-building; of manufactures of cotton; of distilleries and breweries; and of steamboat transportation.

There are reasons for believing that the results of this attempt to take parts of the census by expert special agents, each charged with the duty of surveying the operations of a particular industry throughout the whole country, have not been so satisfactory as was expected. The territory covered by each person is so large, and the inquiries are so minute, that there was much risk of omissions, and little chance of thorough revision. The Census Office seems to have been seriously embarrassed by the mass of undigested material thrown into it, and a perfectly satisfactory conclusion of its task has hardly been looked for, as the conviction has grown that it has undertaken a work beyond the reach of its capacity. It may, however, be said that the results of many of the inquiries have assured value, and may be regarded as giving peculiar distinction to the tenth census. In the returns were included, for the first time, statistics of railroads, telegraph lines, and life, fire,

and marine insurance, while the bulk of the material collected in the departments of manufactures and agriculture has been double that obtained by any former census. In relation to taxation and public debt, the investigations were extended to embrace details which have never been presented in regard to the indebtedness of any other country in the world. (S. S. C.)

The census of 1890 followed in many particulars the methods and objects of 1880. The office of Superintendent of the Census was again created, with an annual salary of $6000, and Robert P. Porter, of New York, was chosen Superintendent, his Chief Clerk being Alfred F. Childs. The maximum cost of the work was fixed at $6,400,000, exclusive of cost of publication. The enumeration of the people began June 1st, the time given for enumeration being the same as in the Tenth census. The population of the whole country and the several states was announced in about three months, while that of counties, cities, and smaller sub-divisions, was announced from time to time afterwards. The labor of counting the returns was greatly reduced by the employment of a mechanical enumerator, the invention of Mr. Herman Hollerith. The Census Bureau has published besides the preliminary and general population tables, the returns from certain industries, and other special details, which are issued in Bulletins as completed. The entire work is well advanced, and the publication will be more prompt than in any previous census. The final and complete results of the census will be comprised in thirteen volumes, of these, the First Volume will give the general population, including the inhabitants of states, counties, towns, etc., place of birth, color, and other particulars. Volume Two will embrace statistics of health and physical condition of the people, mortality, etc. Volume Three will be devoted to statistics of public schools, illiteracy, pauperism and crime, and of churches and religious bodies. Volume Four will be confined to the statistics of trades and professions. Volume Five to the survivors of the civil war. Volume Six to the particulars of wealth, taxation, public debts, and the estimated value of property. Volume Seven will contain general statements of the indebtedness of business corporations and individuals, including mortgages. Volume Eight will be confined to agricultural statistics; Volume Nine to manufacturing industries; Volume Ten to mines and mining; Volume Eleven to fish and fisheries; Volume Twelve to transportation, railways and navigation, telegraphs and telephones; and Volume Thirteen to insurance. In the agricultural volume will be included a full statement of the results of irrigation in the United States, a subject never before fully treated.

The following is a list of the experts engaged in special work on the census, each having the title of special agent. *Agriculture*—John Hyde and Mortimer Whitehead; *Churches*—Rev. Dr. Henry K. Carroll; *Education*—Prof. James H. Bludgett; *Electrical Statistics*—Allen R. Foote; *Farms, Homes, and Mortgages*—George K. Holmes, John S. Lord, and John D. Leland; *Fish and Fisheries*—Prof. Charles W. Smiley; *Geography*—Henry Gannett: *Insurance*—Charles A. Jenney and Henry R. Hayden; *Indians*—Thomas Donaldson; *Manufactures*—Frank R. Williams, Edward Stanwood (cotton), William L. Sweet (iron and steel), Henry Bower (chemicals), Henry T. Cook (pottery), Joseph D. Weeks (glass), G. W. Graeff Jr. (manufactured gas), Peter T. Wood (mixed textiles), Byron Rose (silk and silk goods), S. N. D. North (wool and worsted); *Mines and Mining*—Dr. David T. Day, R. P. Rothwell (gold and silver), John H. Jones (coal), John Birkinbine (iron ore), C. Kirchhoff, Jr. (copper, lead, and zinc), J. B. Randol (quicksilver), Joseph D. Weeks (manganese, petroleum, and natural gas), William C. Day, (building stone), George H. Kunz (precious stones), E. Willis (phosphate rock), Dr. A. C. Peale (mineral waters); *National and State Finances*—J. K. Upton. *Population*—William C. Hunt; *Newspapers and Periodicals*—S. N. D. North; *Pauperism and Crime*—Frederick H. Wines; *Recorded Indebtedness*—John S. Lord, Frederick W. Kruse, and George K. Holmes; *Shipbuilding*—Charles E. Taft; *Social Statistics of Cities*—Henry Tiffany; *Transportation*—Prof. Henry C. Adams; *Vital Statistics*—Dr. John S. Billings; *Wealth, Debt, and Taxation*—T. C. Copeland.

The primary object of the census is the apportionment of power; and it was for this purpose that the framers of the federal constitution incorporated in that instrument a declaration that a decennial census should be taken. Every ten years the ratio of representatives to population is changed, to prevent the House of Representative from growing unwieldy in numbers. The ratio per member provided by the Constitution for the first census, that of 1790, was 30,000; that of the Tenth census (1880) was 151,912; and that of the Eleventh census, 173,901. The number of members given to the House by the Tenth census was 325. In the Congressional session of 1890–91 a reapportionment bill was passed, under which the number of members will be 356, of whom 8 belong to the six new states admitted since 1880. This number is apportioned among the several states as follows:

Alabama	9	Montana	1
Arkansas	6	Nebraska	6
California	7	Nevada	1
Colorado	2	New Hampshire	2
Connecticut	4	New Jersey	8
Delaware	1	New York	34
Florida	2	North Carolina	9
Georgia	11	North Dakota	1
Idaho	1	Ohio	21
Illinois	22	Oregon	2
Indiana	13	Pennsylvania	30
Iowa	11	Rhode Island	2
Kansas	8	South Carolina	7
Kentucky	11	South Dakota	2
Louisiana	6	Tennessee	10
Maine	4	Texas	13
Maryland	6	Vermont	2
Massachusetts	13	Virginia	10
Michigan	12	Washington	2
Minnesota	7	West Virginia	4
Mississippi	7	Wisconsin	10
Missouri	15	Wyoming	1

This arrangement will give a total of 444 electoral votes for President in 1892; votes necessary to a choice 223.

By the Eleventh Census the centre of population in 1890 was in North latitude 39° 11′ 56″ and West longitude 85° 32′ 53″, that is, near Greensburg, Decatur county, Indiana. Since the Tenth Census it had moved westward 48 miles and northward 9 miles. In 1790 it was 23 miles west of Baltimore, and in each succeeding decade it has moved westward about 50 miles.

The total Indian population of the United States, exclusive of Alaska, is reported at 249,373, of this number 32,667 are counted in the general census, being the taxed or taxable Indians.

Other American Censuses.—The only census on the Western continent which can be compared with the American is that of the Dominion of Canada. The first volume of the report of the census of 1880–1 appeared in 1882. The enumeration was made by a special staff organized for the purpose. It consisted of fourteen officers, in charge of as many provinces or large areas, with Mr. J. G. G. Layton, the Director of the Census of 1871, at their head. Under these were placed a corps of 205 district commissioners and 3,183 enumerators, and each rank received full oral instruction from that above it. Included in the enumeration were (1) statistics of living persons—residences, names, sex, age, nativity, religion, profession, education, infirmities, and condition as married or single; (2) returns of deaths and causes of death for the twelve months preceding; (3) public institutions, real estate, and industrial establishments; (4) cultivated lands, field products, etc.; (5) live stock, animal products, and furs; (6) forest industries and their products; (7) shipping and fisheries; (8) mineral products. The enumeration of the Indian population scattered over the northern parts of the Dominion was found to be impossible, and the estimates of 1871 were taken instead. This census does not include Newfoundland or its dependency, Labrador. For the former we have the census of 1874, with estimates for 1881; for the latter, estimates only.

Mexico makes no general enumeration of her people, but furnishes estimates for her provinces of various degrees of accuracy. In Central America Guatemala, in 1880, took a census by enumeration, which included nineteen of the twenty-two departments. Salvador took an official census in 1878, but apparently by estimate rather than enumeration. No census of Honduras, or Nicaragua, or Costa Rica has ever been taken, as the Indian population, which is much in the majority, will not agree to be counted. For the West Indies generally (as also for Iceland, Greenland, and the Bermudas) we have accurate returns, secured through the European governments, who own all these islands but one. For the Dominican Republic and for that of Hayti we have nothing but vague governmental estimates.

In South America Venezuela made an exact census of its people in 1881, making no distinction between the different stocks of the population. Colombia has taken no census since that of 1870, from which the uncivilized Indians were excluded. From Ecuador we have official estimates of 1878, with a rough guess at the number of uncivilized Indians. Peru made an official census in 1876, excluding the Indian savages. For Bolivia there are merely estimates made in 1878. Chili made an enumeration in 1875, which is supplemented by official estimates for 1880. The Argentine Confederation supplements in the same way the census taken in 1869. Uruguay completed a partial enumeration in 1880, which is supplemented by estimates. Brazil has made a nearly complete enumeration, which was begun in 1872 and ended by 1876. It distinguishes free persons from slaves, and excludes uncivilized Indians.

For the general results see the article AMERICA.

The English Census of 1891.—The last census in England was taken at midnight of the 5th of April, 1891. It was taken under three acts; one for England, one for Scotland, and one for Ireland. The Local Government Board, the Secretary of State, and the Lord Lieutenant were respectively charged with the execution of these acts. These acts provided for an enumeration of the people on the 5th of April, 1891; and they contained penalties for a refusal to give information or for giving false information.

In Ireland alone were particulars gathered as to the religious beliefs of the persons enumerated, but no penalty was incurred by a refusal to answer this question. The schedule for householders contained columns for information as to the name and surname; relation to head of family; condition as to marriage; sex; age last birthday; rank, profession, or occupation; place of birth, and if deaf or dumb, blind, imbecile, or lunatic. Minute directions were given as to the order in which "rank, profession, or occupation" should be stated, with special reference to ministers of religion. These schedules were distributed a week in advance by the enumerator. To facilitate the work the country was divided into superintendent registrars' districts, which were again divided into sub-districts, each having a local registrar of births and deaths. The local registrars laid out their sub-districts into about 40,000 enumeration districts, following parish and township lines where it was possible to do so, and aiming to give each enumerator about two hundred houses in the towns, and in sparsely populated parts a district involving not more than fifteen miles' travel. There were also special districts, prisons, workhouses, hospitals, etc., with over 200 inmates, for which the chief officials were made enumerators. The customs officers were intrusted with the duty of enumerating persons on board merchant vessels, fishing-boats, and other craft in various ports and rivers. The schedules in these cases were filled up by the masters of the vessels on the census day; and on the arrival of every home trade and coasting vessel within the month next following the masters of such vessels were required to fill up a schedule, if they had not previously done so in any port

Populations According to Recent Censuses.

COUNTRY.	Date of Census.	Population.
France	1886	38,218,903
Prussia	1885	28,318,470
Saxony	1885	3,182,003
Bavaria	1885	5,420,199*
Wurtemberg	1885	1,995,165
Baden	1885	1,601,225
Austria	1880	22,144,244
Hungary	1880	15,725,710
Belgium	1888	6,030,043
Holland	1888	4,505,932
Switzerland	1888	2,934,057
Sweden	1880	4,565,668
Norway	1878	1,878,100
Spain	1887	17,550,246
Italy	1885	29,699,781
Russia (in Europe)	1887	93,601,898
England and Wales	1881	25,968,286
Scotland	1881	3,734,370
Ireland	1881	5,159,839
United States	1890	62,480,540
Denmark	1880	1,969,039
Finland	1887	2,232,578
Portugal	1878	4,160,315
Turkey (in Europe)	1878	8,630,950
Greece	1889	2,187,208
Dominion of Canada	1881	4,324,810
Newfoundland and Labrador	1884	197,335
Bermudas	1879	13,956
Mexico	1888	12,328,609
Central America	1878	2,893,000
West Indies (estimated)	.....	4,617,450
Brazil	1872	11,108,251
S. America (except Brazil) estimated	.....	28,380,250
Asia (estimated)	.....	795,591,000
Africa (estimated)	.....	205,823,260
Australia	.....	4,232,000
Polar Regions (estimated)	.....	82,500

in the United Kingdom. In the army and navy the enumeration was conducted by the authorities at the Horse Guards and Admiralty. Care was taken to include those sleeping on the night of April 3d in barns, tents, or in the open air; the case of the few people travelling on that night was provided for, and the schedule was not to take any notice of those who died at 11.59 P.M. or were born at 12.01 A.M.

The English enumerators had a fixed fee of a guinea, with 2s. 6d. for every hundred names above 400. Thus, if a man had a district of 200 houses and 1200 inhabitants, about as many as he could attend to, he earned £2 1s.—say, $10. To get this he must have left the schedule with every occupier of a house or tenement during the preceding week, and on the 3d of April he must have collected the schedules, seeing that they were filled up correctly, and filling them in himself in cases of neglect or incapacity. Then it was his duty to copy their contents into enumeration books, to summarize them, describe accurately the boundaries of the district, and hand over books and schedules to the registrar. In Wales some 20,000 of the 60,000 schedules issued in Welsh were returned filled up in that language, and had to be translated. The registrar revised carefully the entries in the enumeration books, collated them and prepared a summary for his sub-district, which was forwarded with all the documents to the superintendent registrar. Upon the superintendent registrar was imposed the duty of making a general revision of the returns and of testing their accuracy

POPULATION BY STATES AND TERRITORIES, 1790-1880.

Aggregate Population at each Census as Constituted at the Date of that Census.

(NOTE.—The narrow column under each census year shows the order of the States and Territories when arranged according to magnitude of population.)

States and Territories.	1880.		1870.		1860.		1850.		1840.		1830.		1820.		1810.		1800.		1790.	
Total.....	50,155,783		38,558,371		31,443,321		23,191,876		*17,069,453		†12,866,020		9,633,822		7,239,881		5,308,483		3,929,214	
Alabama.....	17	1,262,505	16	996,992	13	964,201	12	771,623	12	590,756	15	309,527	19	127,901	...	.....	...	.....	...	.....
Arizona.....	44	40,440	46	9,658	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Arkansas.....	25	802,525	26	484,471	25	435,450	26	209,897	25	97,574	28	30,388	26	14,255	...	.....	...	.....	...	.....
California.....	24	864,694	24	560,247	26	379,994	29	92,597	...	.....	..	.....	...	.....	...	.....	...	.....	...	.....
Colorado.....	35	194,327	41	39,864	38	34,277	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Connecticut...	28	622,700	25	537,454	24	460,147	21	370,792	20	309,978	16	297,675	14	275,148	9	261,942	8	251,002	8	237,946
Dakota	40	135,177	45	14,181	42	4,837	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Delaware.....	38	146,608	35	125,015	32	112,216	30	91,532	26	78,085	24	76,748	22	72,749	19	72,674	17	64,273	16	59,096
D.of Columbia	36	177,624	34	131,700	35	75,080	33	51,687	28	43,712	25	39,834	25	33,039	22	24,023	19	14,093	...	.....
Florida.....	34	269,493	33	187,748	31	140,424	31	87,445	27	54,477	26	34,730	...	.....	...	.....	...	.....	...	.....
Georgia	13	1,542,180	12	1,184,109	11	1,057,286	9	906,185	9	691,392	10	516,823	11	340,985	11	252,433	12	162,686	13	82,548
Idaho.....	46	32,610	44	14,999	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Illinois.....	4	3,077,871	4	2,539,891	4	1,711,951	11	851,470	14	476,183	20	157,445	24	55,162	24	12,282	...	.....	...	.....
Indiana	6	1,978,301	6	1,680,637	6	1,350,428	7	988,416	10	685,866	13	343,031	18	147,178	21	24,520	21	5,641	...	.....
Iowa.....	10	1,624,615	11	1,194,020	20	674,913	27	192,214	29	43,112	...	.....	...	.....	...	.....	...	.....	...	.....
Kansas	20	996,096	29	364,399	33	107,206	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Kentucky	8	1,648,690	8	1,321,011	9	1,155,684	8	982,405	6	779,828	6	687,917	6	564,135	7	406,511	9	220,955	14	73,677
Louisiana.....	22	939,946	21	726,915	17	708,002	18	517,762	19	352,411	19	215,739	17	152,923	18	76,556	...	.....	...	.....
Maine	27	648,936	23	626,915	22	628,279	16	583,169	13	501,793	12	399,455	12	298,269	14	228,705	14	151,719	11	96,540
Maryland.....	23	934,943	20	780,894	19	687,049	17	583,034	15	470,019	11	447,040	10	407,350	8	380,546	7	341,548	6	319,728
Massachusetts	7	1,783,085	7	1,457,351	7	1,231,066	6	994,514	8	737,699	8	610,408	7	523,159	5	472,040	5	422,845	4	378,787
Michigan.....	9	1,636,937	13	1,184,059	16	749,113	20	397,654	28	212,267	27	81,639	27	8,765	25	4,762	...	.....	...	.....
Minnesota.....	26	780,773	28	439,706	30	172,023	36	6,077	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Mississippi.....	18	1,131,597	18	827,922	14	791,305	15	606,526	17	375,651	22	136,621	21	75,448	20	40,352	20	8,850	...	.....
Missouri.....	5	2,168,380	5	1,721,295	8	1,182,012	13	682,044	16	383,702	21	140,455	23	66,557	23	20,845	...	.....	...	.....
Montana.....	45	39,159	43	20,595	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	..	.....
Nebraska.....	30	452,402	36	122,993	39	28,841	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Nevada.....	43	62,266	40	42,491	41	6,857	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
N.Hampshire.	31	346,991	31	318,300	27	326,073	22	317,976	22	284,574	18	269,328	15	244,022	16	214,460	11	183,858	10	141,885
New Jersey....	19	1,131,116	17	906,096	21	672,035	19	489,555	18	373,306	14	320,823	13	277,426	12	245,562	10	211,149	9	184,139
New Mexico..	41	119,565	37	91,874	34	93,516	32	61,547	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
New York.....	1	5,082,871	1	4,382,759	1	3,880,735	1	3,097,394	1	2,428,921	1	1,918,608	1	1,372,111	2	959,049	3	589,051	5	340,120
N. Carolina...	15	1,399,750	14	1,071,361	12	992,622	10	869,039	7	753,419	5	737,987	4	638,829	4	555,500	4	478,103	3	393,751
Ohio.....	3	3,198,062	3	2,665,260	3	2,339,511	3	1,980,329	3	1,519,467	4	937,903	5	581,295	13	230,760	18	45,365	...	.....
Oregon	37	174,768	38	90,923	36	52,465	34	13,294	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Pennsylvania	2	4,282,891	2	3,521,951	2	2,906,215	2	2,311,786	2	1,724,033	2	1,348,233	3	1,047,507	3	810,091	2	602,365	2	434,373
Rhode Island.	33	276,531	32	217,353	29	174,620	28	147,545	24	108,830	23	97,199	20	83,015	17	76,931	16	69,122	15	68,825
S.Carolina.....	21	995,577	22	705,606	18	703,708	14	668,507	11	594,398	9	581,185	8	502,741	6	415,115	6	345,591	7	249,073
Tennessee.....	12	1,542,359	9	1,258,520	10	1,109,801	5	1,002,717	5	829,210	7	681,904	9	422,771	10	261,727	15	105,602	17	35,691
Texas.....	11	1,591,749	19	818,579	23	604,215	25	212,592	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Utah.....	39	143,963	39	86,786	37	40,273	35	11,380	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Vermont.....	32	332,286	30	330,551	28	315,098	23	314,120	21	291,948	17	280,652	16	235,966	15	217,895	13	154,465	12	85,425
Virginia.....	14	1,512,565	10	1,225,163	5	1,596,318	4	1,421,661	4	1,239,797	3	1,211,405	2	1,065,116	1	974,600	1	880,200	1	747,610
Washington...	42	75,116	42	23,955	40	11,594	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
West Virginia	29	618,457	27	442,014	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....
Wisconsin.....	16	1,315,497	15	1,054,670	15	775,881	24	305,391	30	30,945	...	.....	...	.....	...	.....	...	.....	...	.....
Wyoming.....	47	20,789	47	9,118	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....	...	.....

* Including 6,100 persons on public ships in the service of the United States.

† Including 5,318 persons on public ships in the service of the United States.

with a view of seeing that the registrars and enumerators had properly performed their duties. By the end of May all the returns and books were in London, and a month later the preliminary statement of the result of the census was published. The returns for the population of the United Kingdom 35,246,562 in 1881.

In relation to the general subject, the following works may be consulted:—A. Quetelet, *Sur l'Homme et le Développement de ses Facultés; ou Essai de Physique sociale;* David Hume "On the Populousness of Ancient Nations," *Philosophical Works,* vol. iii.; Quetelet et Heuschling, *Statistique Internationale;* Lord Macaulay, *History of England,* vol. i.; Babbage, *Ninth Bridgewater Treatise; Reports and Proceedings of the International Statistical Congress, Fourth Session* (London, 1861); Boeckh, *Political Economy of the Athenians,* Book IV, chap. 5; Sir John Sinclair, *History of the Statistical Account of Scotland;* John Graunt, *Natural and Political Observations on the Bills of Mortality;* Moreau de Jannes, *État économique et sociale de la France depuis Henri IV jusqu' à Louis XIV.* The *London Statistical Society's Journal* contains numerous articles on the census, and is of the greatest value to those investigating the subject. (S. S. C.)

UNITED STATES CENSUS OF 1890.

Area and Population of States and Territories.

States and Territories.	Rank in Area.	Land Area.	Rank in Pop.	Population.
Alabama	26	51,540	17	1,508,073
Arizona	5	112,920	48	59,620
Arkansas	25	53,045	24	1,128,179
California	2	155,980	22	1,208,130
Colorado	7	103,645	31	412,198
Connecticut	47	4,845	29	746,258
Delaware	48	1,960	42	168,493
District of Columbia	50	60	39	230,392
Florida	21	54,240	32	391,422
Georgia	19	58,980	12	1,837,353
Idaho	10	84,290	45	84,385
Illinois	22	56,000	3	3,826,351
Indiana	37	35,910	8	2,192,404
Indian Territory	38	31,000		
Iowa	24	55,475	10	1,911,896
Kansas	13	81,700	19	1,427,096
Kentucky	35	40,000	11	1,858,635
Louisiana	29	45,420	25	1,118,587
Maine	40	29,895	30	661,086
Maryland	42	9,860	27	1,042,390
Massachusetts	45	8,040	6	2,238,943
Michigan	20	57,430	9	2,093,889
Minnesota	12	79,205	20	1,301,826
Mississippi	30	46,340	21	1,289,600
Missouri	17	68,735	5	2,679,184
Montana	3	145,310	44	132,159
Nebraska	15	76,840	26	1,058,910
Nevada	6	109,740	49	45,761
New Hampshire	44	9,005	33	376,530
New Jersey	46	7,455	18	1,444,933
New Mexico	4	122,460	43	153,593
New York	28	47,620	1	5,997,853
North Carolina	27	48,580	16	1,617,947
North Dakota	16	70,195	41	182,719
Ohio	34	40,760	4	3,672,316
Oklahoma	36	38,830	46	61,834
Oregon	9	94,560	38	313,767
Pennsylvania	31	44,985	2	5,258,014
Rhode Island	49	1,085	35	345,506
South Carolina	39	30,170	23	1,151,149
South Dakota	14	76,850	37	328,808
Tennessee	33	41,750	13	1,767,518
Texas	1	262,290	7	2,235,523
Utah	11	82,190	40	207,905
Vermont	43	9,135	36	332,422
Virginia	32	40,125	15	1,655,980
Washington	18	66,880	34	349,390
West Virginia	41	24,845	28	762,794
Wisconsin	23	54,450	14	1,686,880
Wyoming	8	97,575	47	60,705
United States	.....	2,970,000	.....	62,622,250
" " Gross area	.....	3,025,600		

This number does not include population of Indian Territory and Alaska.

CENTOFANTI, Silvestro (1794–1880), an Italian philosopher and literary historian, was born at Calci, near Pisa, Dec. 8, 1794. He studied law, but soon devoted himself especially to literature and philosophy. In 1829 he published *Edipo Re,* a tragedy, and afterward some essays on Dante and Alfieri. In 1841 he was made professor of philosophy at Pisa. On account of his active participation in the revolutionary movements of 1848 he was removed from his professorship, but in 1849 he was appointed inspector-general of the libraries of Tuscany. In 1859 he was restored to his professorship and made a member of the council of state. He afterward became rector of the University of Pisa and senator of the kingdom of Italy. He died at Pisa, Jan. 6, 1880. His most important work is *La Letteratura greca dalla sua origine sino alla Caduta di Costantinopoli* (Florence, 1870). He left several works in manuscript, and since his death one has been published, *Vita poetica* (Florence, 1881).

CERAMIC ART. See Pottery.

CEREALS may be defined as seeds or grains used as food and derived from the family of grasses (Gramineæ). It is rather an unfortunate limitation that, regardless of a general similarity in composition, seeds such as those of buckwheat should be excluded from the class of cereals simply because they do not belong to the order of grasses. The term "cereal" should be regarded as expressing a popular rather than a scientific idea, and as indicating use rather than structure. However, accepting the above limitation, the following are the most important representatives:

Barley (*Hordeum*) was one of the earliest domesticated cultivated corn-plants. Under cultivation it has varied immensely. It may be recognized by the two-sided arrangement of its spikelets, which are grouped in threes on opposite sides of the main stem. It is capable of wider geographical range, and hence of enduring greater extremes of temperature, than any other of our common cereals.

Guinea Corn, called also "Indian millet," and in Arabic *durra* or *doura,* is a form of *Sorghum vulgare* which has its grains forming compact nodding masses. It is recognized by botanists as the variety *cernuum,* just as the sweet sorghum, or Chinese sugar-cane, or imphee, which is cultivated for its saccharine juice, is known as the variety *saccharatum.* Broom-corn is a close botanical relative. The native country is supposed to be either India or Africa. *Penicillaria spicata,* Willd., which is quite another plant, is also known as Guinea corn and bajree. This last and the *Sorghum vulgare* are said to be the support of the negro race in Africa, and both are extensively grown in India.

Indian Corn (*Zea mays*) is a native of America, and is now among the most important of the cereal grains. Owing to its comparatively recent introduction to the civilized world, it is particularly instructive to study it in relation to the changes and variations which culture has produced or may produce in its seed. It was grown by the American aborigines from Chili to Massachusetts, most likely originating in some warm region, whence it was introduced into its northern and southern ranges. For acclimation over so wide an area no doubt a considerable period was required. Under cultivation it varies in the length of its stalk from 16

inches to 18 feet; in its ears from 1½ inches to 16 inches; and in the number of rows of seeds on the ear, from 6 to 40, or even more, and the grains may be of almost any color save green. The varieties of Indian corn cross with the greatest readiness, and it is impossible to prevent such crossing in neighboring fields. The male flowers are on the summit of the stem, and the female flowers appear in the ear. It is widely cultivated in temperate regions, and probably supports a larger number of human beings than any other cereal except rice.

Millet is a general term used to designate various small, hard-seeded grasses, of which the stems may be used for forage, and the seed, in the form of flour or otherwise, as food for man and beast. *Sorghum vulgare* and *Penicillaria*, besides being known as Guinea corn, are also called millet or Egyptian millet. Under the genus known to botanists as *Setaria* we have the varieties of millets known as Hungarian, German, and Italian, which all produce good flour. This genus is characterized by having the flowers clustered into a dense head or spike, and the peduncles which support the individual flowers terminating in solitary or clustered bristles. *Panicum* is another genus of which three species at least are cultivated in India, and are called millet. The word "millet" is held to imply that seed so named would produce a thousand-fold. The name is applied to a great many species of grass and their seeds.

Oats.—The true oat is the *Avena sativa* of botanists, but besides this other plants also bear the same name. Thus *Avena sterilis* is the so-called "animated oats." A species of *Arrhenantherum* is the false oats. A *Uniola* is also known as water oats; *Zizania aquatica* is the wild rice or water oats of North America; and *Avena fatua* is the wild oats. The one first named (*Avena sativa*) only can be regarded as a productive cereal. This grain was introduced into cultivation in Europe at least as early as the pre-historic Bronze age; the grains, however, were originally much smaller than those cultivated now. The parent stock and the ative land of the common oats are both unknown.

Rice (*Oryza sativa*) is supposed to be of Asiatic origin, though this is by no means certain, and a reputed parent is by some alleged to have been found in South America. It was introduced into this country from Madagascar in the year 1700. Though still a very important crop in the Southern United States, the quantity raised there is not increasing. It is of all the cereals the one in most extensive use over the world, supporting more human beings than any other food, and in the East Indies it furnishes an intoxicating drink as well. Besides the above commercial rice, other plants are also known as one form or another of rice. Thus, *Zizania aquatica*, along with its other names, is called Canada rice and also Indian rice, from the fact of its seeds being used as a cereal grain by the northern aborigines. One form of the genuine rice has been so modified by cultivation that it has lost its awns and can be grown without irrigation.

Rye (*Secale cereale*) is one of the longest known and most generally prized of the cereals. It appears to have been introduced into Switzerland before the times of history. It is distinguished from wheat by having "two flowers in a spikelet and a long-stalked rudiment of a third floret, and the glumes (outer chaff) subulate awl-shaped." It is said to be less variable than of the cereals, but this Mr. Darwin explains by hat it has been less observed One observer (Karl Koch) asserts that it has been found small and wild in the mountains of the Crimea. This statement, if true, is far from proving that it originated there. In range barley and rye extend farther north than wheat, maturing on our western coast as far north as latitude 57°, though on the eastern coast they rarely reach 52°.

Wheat (*Triticum vulgare*).—Of this two principal varieties may be recognized—*i. e.*, spring and winter wheat; or, regarded from another point of view, we may assert that cultivation has developed not less than 400 varieties out of the one or more parent species from which our wheat has descended. In no other cereal do we find the starchy and the nitrogenized elements so admirably combined; hence no other can be regarded as so nearly furnishing a perfect food. A small-eared, small-grained variety appears to have been cultivated in Switzerland as early as the pre-historic Stone period.

Mr. Darwin has said (*Animals and Plants under Domestication*, vol. i. p. 377): "It is a remarkable fact that botanists are not universally agreed on the aboriginal parent of any one cereal plant. For instance, a high authority writes in 1855, 'We have no hesitation in stating our conviction, as the result of all the most reliable evidence, that none of these Cerealia exist, or have existed, truly wild in their present state, but that all are cultivated varieties of species now growing in great abundance in Southern Europe or Western Asia.' As an offset to the above nearly every year some enthusiastic botanist publishes a positive statement that he has discovered the parent-plant of one or more of our cereals; so that we may well conclude the origin of most, if not all, is fairly an open question."

Besides the above graminaceous plants we may name, as of some importance to man, the sea-lyme grass (*Elymus arenarius*), which, though uncultivated, affords seed which is used in Iceland as a food in want of something better. What is called mand and naglaragee in India is (*Eleusine coracana*) the same as the natchnee of the Coromandel coast, and is of great importance in India on failure of the rice-crop. Fundi or fundingo of the west coast of Africa is produced by *Paspalum exile*. Teff (*Poa Abyssinica*) and tocusso (*Eleusine Tocusso*) are both cereals grown in Abyssinia. *Spelt*, a grain closely akin to wheat, has a limited culture in Europe, and is sown in a small way in Virginia. The list of possible cereals which the order of Gramineæ could furnish must be considered as very long, for as a whole the order has very few, if any, poisonous species. Hence what seeds shall be utilized as food is largely a question of need on the one hand and abundance on the other.

There are other plants which do not belong to this order, but which, so far as the contents of their seed and their relation to human wants go, might well enough be included with them. Such, for example, are the buckwheat; the Egyptian lotus (*Nelumbium*); quinoa (*Chenopodium Quinoa*), from the Pacific slope of the Chilian and Peruvian Andes; and also various species of *Atriplex*, which have been long used as food by the aborigines in California, Utah, and Nevada.

(J. T. R.)

CERRO GORDO. See MEXICAN WAR.

CERTHIIDÆ, a family of small tenuirostral oscine passerine birds, chiefly represented by the genus *Certhia*, of a few species or varieties of the northern hemisphere. These are the creepers, properly so called, though the

name has been applied to many other birds (see CREEPER); their relationships are with nuthatches and titmice. The bill is extremely slender, acute, decurved, about as long as the head; the feet are furnished with large curved claws; the tarsus is scutellate, shorter than the middle toe and claw; the tail is long, of twelve rigid acuminate feathers, like those of a woodpecker; the wings are pointed, with ten primaries, of which the first is very short. The common brown creeper of Europe, Asia, and North America is about 5½ inches long, the wing and tail each about 2¾; the under parts are white, often tinged with rusty brown behind; the upper parts, including the wings, are singularly variegated with blackish, whitish, and different shades of brown, becoming quite bright on the rump, the wings having several bars of tawny or fulvous whitish. The creeper is an extremely active little bird, generally seen scrambling nimbly on a spiral course up the trunks and larger branches of forest trees, the tail pressed against the support like a woodpecker's; it never hangs head downward like a nuthatch. The food consists of small insects which lurk in the cracks of the bark; the nest is built in a natural hollow of a tree, the weak bill of the bird being inadequate to excavate one; the eggs are numerous, white, speckled with reddish brown. The species of *Certhia*, if more than one, are very closely related; *C. mexicana* is one of the most distinct. There are other genera of the family, as that of the European wall-creeper, *Tichodroma muraria*, commonly considered the type of a different sub-family. The Australian genus *Climacteris* is commonly ranged in this family. (E. C.)

CESNOLA, COUNT LOUIS PALMA DI, an American soldier and archæological explorer, was born at Rivarolo, near Turin, Italy, June 29, 1832. He was educated at the military schools of his native city, and served in the Italian war of 1848 and in the Crimean war. In 1860 he came to America and gave instruction in music in New York City. At the outbreak of the civil war he enlisted, and was appointed colonel of the Fourth New York Cavalry. After two years' service he was wounded and taken prisoner at Aldie, Va., June 17, 1863. Ten months later he was exchanged, and again served in the operations under Gen. Grant. After the war he was appointed United States consul to Cyprus, and while residing in that island became interested in archæological exploration. A firman from the sultan enabled him to prosecute his researches on an extensive scale. In 1866 he opened the necropolis of Dali, the ancient Idalium, discovering numerous coins, gems, vases, and bronzes. He excavated also the sites of Salamis, Citium, and Golgos, uncovering at the latter a great temple of Venus with valuable remains of ancient art. In 1870 the jealousy of Turkish officials interrupted his labors. His collection then comprised thirteen thousand articles, and in 1872 it was submitted to the examination of the experts of the British Museum. It was purchased by Mr. J. Taylor Johnston of New York, and presented to the Metropolitan Museum of Fine Arts in that city. Gen. Cesnola brought the collection to New York, and spent several months in arranging and classifying the contents; then, returning to Cyprus, he resumed his investigations, and identified the sites of several ancient cities. In 1875 he explored Curium, and the treasures here found in a vault of a temple were afterward added to the collection in the Metropolitan Museum. This now comprises forty thousand objects of great archæological value. Gen. Cesnola has published an account of his work in *Cyprus: Its Ancient Cities, Tombs, and Temples* (1878). In 1879 he was appointed director of the Metropolitan Museum of Art. He has been elected a member of several European academies, and has received the degree of LL.D. from Princeton and Columbia Colleges. Serious attacks have been made on the genuineness and authenticity of Gen. Cesnola's discoveries, especially by Mr. Clarence Cook of New York. An unpleasant controversy also arose between Gen. Cesnola and Mr. Feuardent, who had been employed as an archæological expert in repairing many of the articles exhibited. A tedious lawsuit which ensued ended in February, 1884, in favor of Gen. Cesnola.

CETEWAYO, CETYWAYO, or KETCHWAYO (died 1884), king of the Zulus, was the son of Panda, or Umpande, who was known as one of the most peaceable and quiet chieftains of his race. Cetywayo in 1854 had a quarrel with his brother Umbulazi regarding the succession, and, with their father's permission, they decided the question by a combat, in which Umbulazi was slain. Cetywayo afterward became regent. His father died in 1872, and in the following year Cetywayo was crowned by Mr. Shepstone, a representative of the Natal government, and soon showed a disposition to return to the extreme savagery of his warlike uncles, Dingaan and Chaka. His rule over his own subjects was atrociously severe. His army, organized with skill and well disciplined, consisted of fifty thousand men, grouped in fifteen "black" regiments of unmarried men, and eighteen "white," or married, regiments. There was an old dispute between the Zulus and the Transvaal boers regarding certain land near the Natal frontier. In 1878 Cetywayo's threatening attitude toward the Natal colony caused much uneasiness; and the ultimatum of Sir Henry Bulwer, the colonial lieutenant-governor, requiring the disbandment of the Zulu army being disregarded by Cetywayo, Lord Chelmsford, on Jan. 11, 1879, threw four columns of troops into the Zulu country. On the 22d a British camp at Isandhlwana (Isandula) was overpowered by twenty thousand Zulus, after a stubborn resistance, and nearly fourteen hundred were slain, over one-half being regular European troops. Almost instantaneously the post at Rorke's Drift was assailed; but its one hundred and thirty-nine defenders repelled the Zulus, three thousand strong, with great slaughter. On April 2, while marching to the relief of Ekowe, Chelmsford gave the Zulus a severe defeat at Ginghilovo. On June 1, Prince Napoleon was surprised and slain near Edutu Kraal. The war was ended by the British victory of July 4, four thousand men completely defeating twenty thousand Zulus; the chiefs and people everywhere submitted. Cetywayo himself was made prisoner Aug. 28, and taken to Cape Town. He was afterward sent to England, but in 1882 he was restored to his dominions, now considerably restricted in area and importance, while a British resident was placed in virtual control of Zululand. In the autumn of 1883, Cetywayo was hunted out of the country by his former subjects. He was compelled to give himself up to the British troops, and by them was sent to Natal for safety. He was retained a close prisoner, and on his escape was speedily recaptured. He died in captivity in 1884.

CHADBOURNE, PAUL ANSEL, LL.D. (1823–1883), an American educator, was born at North Berwick, Maine, Oct. 21, 1823. At the age of nineteen

he entered Phillips Academy, Exeter, N. H., and passed thence to Williams College. He graduated in 1848, and after serving as a tutor in the same institution was made professor of chemistry and botany in 1853. While still retaining this position he was (in 1859) made professor of the same branches in Bowdoin College. He also took part in a scientific expedition to Florida, and in another to Greenland. In 1867 he was elected president of the University of Wisconsin, being also professor of metaphysics. By his wisdom and energy the number of students was greatly increased. In 1870 he resigned this position on account of ill-health, but in 1872 he accepted the presidency of Williams College, where he was equally successful. He did not confine his labors to educational matters, but was prominent in religious and political affairs. In 1876 he was a delegate to the national Republican convention, and in 1880 he presided over the Massachusetts State convention of the same party. He died in New York City, Feb. 23, 1883. He was noted for his wide range of scholarship, his practical sense, and his executive ability. His chief publications were *Natural Theology* (1867) and *Instinct in Animals and Men* (1872).

CHADWICK, JOHN WHITE, an American Unitarian minister, was born at Marblehead, Mass., Oct. 19, 1840. Leaving school at the age of thirteen, he entered a store, and afterward worked at shoemaking until 1857, when he went to the Bridgewater State Normal School. Graduating there in 1859, he pursued further studies at Exeter Academy, and in 1861 entered the divinity school at Harvard University. Upon his graduating, in 1864, he was invited almost immediately to the charge of the Second Unitarian Society, in Brooklyn, N. Y., and has remained in that charge to the present time (1884). In the Unitarian denomination his position is on the extreme left wing, unequivocally rationalistic and anti-supernatural. He has contributed extensively to the Unitarian periodical literature, and to other publications. His writings in book-form are *A Book of Poems; Life and Sermons of Rev. N. Augustus Staples*, his predecessor in Brooklyn; *The Bible of To-day; The Faith of Reason; The Man Jesus; Some Aspects of Religion; Belief and Life*, etc. He was elected Phi Beta Kappa poet at Harvard in 1885, and preached the Alumni sermon at the Harvard Divinity School.

CHAIN-MAKING. Most of the chains used in the United States are of foreign manufacture. The decline of the shipbuilding industry in America has kept the chain-makers of the United States from striving to develop a large output, and the business has been established as a regular industry only since 1870, when it was undertaken in Troy, N. Y., and in Philadelphia. The making of small chains by machinery has also been begun in Pittsburg. Machine-made chains are not regarded with as much favor as hand-made chains, because the welding is not so sure as when the heat is determined by the eye of a skilled workman and the welding is done with the hammer.

The workman, taking a rod of the required diameter, brings it to a red heat, and then cuts it to the required length by placing the end against a stop and cutting the bar on a knife-edge by means of hammer blows. The rod is at once returned to the fire, and the piece cut off is bent into a U-shape over the nose of the anvil; this done, the U-shaped link is thrust into the last link of the already made chain, and put into the fire to attain a welding heat, whilst the workman cuts off and bends into shape another piece of the rod; when the link to be welded is at the right heat it is taken out and welded by blows of the hammer upon a nose of the right form for the inside of the link, and is then a "hammer" chain in shop-parlance. Should it be desired to finish the link to a uniform diameter of iron, a "dolly"—which resembles a hammer-head with a semicircular groove of the proper diameter—is placed upon the weld, and the end of the link hammered into a true round.

The principal varieties of hand-made chain in the market are known as open-link chains, stud chains, and flat or twisted-link chains. The open-link chains are made of open ovals left just as bent by the chain-maker. The stud chains have each link strengthened by a cast-iron brace across the middle before being welded up at the end, and may be safely subjected to a high tensile stress. Flat chains have the links twisted so as to coil flatwise on a drum when used for hoisting. In the case of large chain cables the links are sometimes made of lengths of iron cut at an angle, so that the ends will overlap and are bent by expensive machinery, so that the weld will come at the side instead of the end of the link.

It required some time for chains to displace hempen cables in the ground-tackle of vessels, the opinion of mariners being that the elasticity of hempen rope eased the vessel when struck by heavy seas, and that when necessary to slip cable it would require much more time to cut a chain than rope. The discovery that the sag of chain cables sufficed to ease vessels almost as well as the elasticity of hempen cables, however, finally caused their introduction, and effected a great economy and assured greater safety. Hempen cables rot from their alternate exposure to water and air, and sometimes cut from chafing on rocky ground. Chain cables are now furnished with bolts at every 10 or 15 fathoms, which enable mariners to slip a cable with greater ease than formerly was reached by cutting a hempen cable.

The strength of a chain cable is dependent not only on the quality of the iron used, but also upon the skill and conscientiousness of the workman, but it is sometimes impossible for even the best workman to be sure that the weld is perfect; and for this reason the best makers invariably test their chains before sending them away, and give a certificate of test with the cable. The English admiralty proof-tests have been adopted by the largest makers in Philadelphia, one firm having a testing-machine capable of putting a carefully weighed stress upon chains varying from 25 pounds to 150 tons. The tests required by the English admiralty list are regarded by some as excessive and injurious to the resiliency of the iron. Certainly, nothing but the best quality of iron will withstand these tests unimpaired, but when we consider the awful disasters which have arisen from the breaking of chain cables during a gale we cannot regard a rigid insistence upon the best quality of iron and the most thorough workmanship as other than wise. (W. D. M.)

CHAIRS. The Egyptians were probably the first people who made and used chairs. The Egyptian chairs and stools were from 10¾ to 28 inches high—quite a range, but probably some were intended for children, others to be used with foot-stools. In the tombs at Thebes, Alabastron, and elsewhere are found chairs of almost all kinds, including many that modern ingenuity has revived. Among them are thrones, couches, folding and reclining chairs, leather-seated, cane-seated and split-bottomed chairs, and others made

of ebony inlaid with metals and ivory, or with carved backs, sides and legs, often with claw-feet, and upholstered with gorgeous coverings. Illustrations of Egyptian chairs show that they left nothing to be desired in regard either to artistic design or to luxurious ease. Such illustrations are to be found in abundance in the magnificent *Description de l'Egypte*, as well as in Wilkinson's *Customs of the Ancient Egyptians*.

The most elaborate chairs of modern construction are of course still made and finished by the wood-carver and cabinet-maker; but the chairs for every-day household or office use are, in the United States, mostly made by machinery. The principal machines employed for this purpose are the chair-stuff sawing machine, the chair-seat machine, chair-back machine, the chair-seat boring machine and the chair-mortiser.

Chair-back machines may be simply band or jig saws, that cut out the curved back-piece which is placed on the top of the pillars of the chair-back. Moulding or rounding-machines, for chair-backs, have a holder for the stuff, which is moved against a rotary cutter of peculiar shape, the stuff travelling in a prescribed path, so as to receive the conformation desired. Scraping, dressing and polishing machines for chair-backs are similar in their mode of presentation of the stuff, but differ in the character of the tool or appliance to which the work is presented.

The chair-seat machines include the planing machines, by which the wooden bottoms of the chairs are rounded out. The depth of penetration is governed by side guides, which raise and lower the bed relatively to the revolving cutter, or the latter relatively to the bed which carries the chair-seat. Lemmans' machines for hollowing chair-seats have a pattern-seat, over which a governing ball is moved, determining the depth of penetration of the rotary cutter beneath as it passes over the chair-seat stuff. Machines are also constructed for cutting grooves in chair-seat frames for upholstering purposes or to receive the chair-seat, which is pressed into the frame.

Lemmans' chair-mortiser is the most important of the chair-making machines. It is adapted to all kinds of chair-mortising, and serves also as a horizontal boring and mitering machine.

The principle of the machine is rotary. The fixed end of the boring bar moves in a ball-and-socket joint, allowing the bar to revolve and the vibrating end to be moved in any direction desired. The variations from straight mortises to those of different curves are produced by the position of the curved bar upon which the bearing of the movable end of the boring bar slides; when the bar is placed with the curve horizontal the mortises are straight; and they are changed to the greatest curve when the curved part is perpendicular. The range in length of mortise is from boring a hole to a length equal to the greatest travel of the cutting bits; and this range is changed by the stroke of the crank-pin being made greater or less, and also by the arrangement of a handle moving the end of the connecting rod to any position desired, upon a curved rod; which movement produces a greater or less length of the connecting rods. This arrangement will give any length of mortise desired, within the capacity of the machine. The depth of the mortise is regulated by moving the table holding the stuff by a lever in connection with a pinion and rack. The table is raised vertically by a screw and a hand-wheel, and is provided with three clamps of different forms for holding the stuff in the position required for the work. (A. F. H.)

CHALLEMEL-LACOUR, PAUL-AMAND, a French statesman and publicist, born at Avranches, May 19, 1827. He entered the normal school of Paris in 1846, and graduated in 1849. In 1852 he was banished from France on account of his republicanism. He became professor of French literature at Zurich in 1856; returned to France in 1859, and was for several years editor of the *Revue moderne*. He was prefect of the department of Rhône from September, 1870, to February, 1871. In January, 1872, he was elected to the National Assembly for the Bouches-du-Rhône and Marseilles. He gained distinction as an orator and able debater, and belonged to the Left, or advanced republicans. In January, 1876, he was elected a senator for nine years by the department of Bouches-du-Rhône. He was the chief editor of Gambetta's organ, the *République française*. He was appointed ambassador to Bern in January, 1879, and ambassador to London in 1880. In February, 1883, he entered the ministry of Ferry as minister of foreign affairs. He has edited the works of Madame Épinay (2 vols., 1869), and has produced, besides other works, *La Philosophie individualiste* (1864).

CHALLENGE, in law, an exception to jurors who are returned to pass upon a cause at its trial.

Challenges are either to the array or to the polls. A challenge to the array is an objection to all the jurors *returned* collectively, not for any defect in them, but for some partiality or default in the officers who selected, summoned, or arrayed the panel. A challenge to the polls is an objection to one particular juror drawn upon the panel.

Challenges are either peremptory, principal, or for favor. A peremptory challenge is one made without assigning any reasons. Peremptory challenges to the array are not permitted. At common law the defendant in trials for felonies was allowed thirty-five peremptory challenges to the polls. In most States, by statute, this number is reduced to twenty, and in some the privilege is allowed only where the offence is capital. No peremptory challenges were allowed by the common law in civil cases. They are, however, in some States permitted in such cases to a limited extent by statute.

Principal challenges are such as are made for a cause which when substantiated is of itself sufficient evidence of bias against the party challenging. They may be made either to the array or to the polls. The following are common grounds of principal challenge to the array: viz. that the officer making the array is of kindred or affinity to either party within the ninth degree; that such officer is liable to have his goods levied on by either party, or is his servant, attorney, counsellor, or advocate; that he is some way interested in the question to be tried; that either party has brought an action against him, etc., etc.

Principal challenges to the polls may be either *propter honoris respectum* (from regard to rank), which do not exist in the United States; *propter defectum* (on account of some defect), as alienage, infancy, lack of statutory requirements, etc.; *propter delictum* (on account of crime), including cases of legal incompetency on the ground of infamy; or *propter affectum* (on account of partiality), from some bias or partiality, either actually shown to exist or presumed from the circumstances. Common causes of principal challenges to the polls, *propter affectum*, are that the juror has before been heard to express an opinion as to the matter in controversy, that he is of kin either by blood or marriage within the ninth degree to either party, or that he has some interest in the issue of the suit.

Challenges to the favor are those which are made for

a cause which, though not of itself sufficient evidence of bias or partiality, nevertheless affords reasonable ground to suspect that such bias or partiality may exist. Challenges to the favor may be either to the array or to the polls. Common instances of challenge for favor to the array are where there is a relation by marriage between the cousin or son of the officer drawing the panel and one of the parties to the cause, or where the officer has an action of debt or the like against one of the parties. The same circumstances constitute valid causes for challenge for favor to the polls. At common law, challenges to the favor were not determined by the court, but by triers chosen for the purpose. There is no limit to the number of principal challenges and challenges to the favor which are allowed to the parties both in criminal and civil cases.

Challenges to the array may at common law be made at any time prior to the swearing of the petit jury. But this is altered in many States by statute, and now the objection must generally be made on the first day in which the panel appears in court.

Challenges to the polls are to be made after the empanelling and before the swearing of the jury. If postponed beyond this point they are too late.

CHALLENGE, in criminal law, a request made by one person to another to fight a duel. The request may be either verbal or in writing. The sending of a challenge is in most civilized countries an indictable offence, for which severe punishment is prescribed. The offence of carrying a challenge is also indictable. (L. L., JR.)

CHAM. See NOE.

CHAMBERLAIN, JOSEPH, an English Liberal statesman, was born in London, July, 1836. He was educated at University College school, and became a member of a firm of wood-screw makers at Birmingham. From this firm he retired in 1874 with independent means. He had previously taken a deep interest in the welfare of that city, and had become prominent as a public speaker. In 1868 he was made chairman of the executive committee of the National Education League, and on its behalf conducted an agitation which resulted in the Elementary Education Act of 1870. Under this act the first school board in Birmingham was elected, Mr. Chamberlain being one of its members. In 1873 he was chosen president of the board. He was an ardent advocate of free, compulsory secular education, and opposed the compromising policy of Mr. W. E. Forster. In articles in the *Fortnightly Review* he criticised the conduct of the leaders of the Liberal party on this and other important questions, urging aggressive, radical measures. These he summed up in the motto he suggested for the party: "Free Church, free land, free schools, and free labor." So bold were his public utterances that many regarded him as desiring not only the disestablishment of the church, but also a republican form of government. Meantime, he was elected an alderman of Birmingham, and for three years (1873–76) was mayor of that borough. In 1874 he was presented as a candidate for Parliament from Sheffield, in opposition to Mr. Roebuck, but was defeated. In 1876 he was elected from Birmingham. In 1880, when the Liberals returned to power under Mr. Gladstone, Mr. Chamberlain was admitted to a seat in the cabinet as president of the Board of Trade. During the general election of 1886 he was very severe in his strictures on the Moderate Liberals. He became president of the Local Governing Board in 1886, but soon resigned on account of his opposition to the Gladstonian Home-rule measures, to which he grew bitterly hostile. He visited Ulster in 1887, where he strengthened the Union cause. He soon after came to America as one of the Commissioners to settle the Fishery dispute.

CHAMBERLAIN, JOSHUA LAWRENCE, LL.D., an American instructor, born at Bangor, Maine, Sept. 8, 1828, studied at a military school at Ellsworth, Me., and graduated at Bowdoin College in 1852; completed the theological course at the Bangor Seminary in 1855; held a professorship of modern languages in Bowdoin College 1855–62; was engaged 1862–65 in the military service of the United States, attaining the rank of major-general of volunteers and division commander in the Potomac army. He was in twenty-four pitched battles, and was six times wounded. In 1865 he resumed his college professorship. He was governor of Maine 1867–71, and from 1871 to 1883 was president of Bowdoin College.

CHAMBERS, WILLIAM (1800–1883), a Scottish publisher and author, born at Peebles, April 16, 1800. His family, which was respectable, had lived for many generations in his native town, but had become poor, having met with reverses. He and his brother Robert received a good school education, but on the removal of the family to Edinburgh in 1813 were obliged to shift for themselves. They were ardent readers and very industrious. From 1814 to 1819, William led a hard life as apprentice to John Sutherland, a bookseller. He then embarked in the business in a very small way, his capital being five shillings. He kept a bookstall, which expanded in dimensions when, by the generous loan of £10 from Mr. Robert Miller, he bought a number of books at a trade-sale. For £3 he purchased a hand-press, with a lot of old types, and taught himself to print. His brother Robert (1802–1871) had been pursuing a similar thrifty course, and in 1829 they projected jointly *The Gazetteer for Scotland*, which appeared in 1832. Owing to their intelligence, thrift, and industry their fortunes were steadily improving, and they now projected a work which was greatly to increase their means and reputation. This was *Chambers's Edinburgh Journal*, the object of which was to diffuse valuable information to the people at a very cheap rate. It was issued weekly at three halfpence a number. The success was immediate and great; its circulation was at once over 50,000 copies, and its influence on popular education can hardly be over-estimated. Cheap publications became the order of the day. Not long after appeared the *Penny Magazine* by other hands, but the *Journal* owed nothing to it in original idea or impulsion. In 1834 they began a series of papers on all topics entitled *Information for the People*, which had a very large circulation. *The Educational Course*, a series of manuals for instruction, was begun in 1835. They were prepared under the direction of—and some of them written by—Robert, but published by the firm. These were followed by *Tracts* and *Papers for the People*, in 12 volumes.

The excellent *Cyclopædia of English Literature*, issued in 1844, in 2 vols. 8vo, and reprinted in America, was the work of Robert Chambers, aided by his friend Dr. Robert Carruthers. In 1849, William purchased the estate of Glen Ormiston in Peeblesshire, where he inaugurated many public improvements, and in 1859 he presented to the town of Peebles a library and reading-room, a museum and an art-gallery, and a lecture-hall, all forming "The Chambers Institution." In 1854 he published *Things as they Are in America*, and in 1855 *American Jottings*. The next year was issued the *Pio-*

torial *History of England* and an illustrated *History of the Russian* [Crimean] *War*. In 1864 he finished a *History of Peeblesshire*, which had been some time in hand. He was honored in 1865 by being elected lord provost of Edinburgh, and his administration was marked by important sanitary reforms in the city. He had begun in 1859 and completed in 1868 *Chambers's Encyclopædia*, in 10 volumes, which accomplished its purpose in presenting a library of universal knowledge at once comprehensive, cheap, and handy. He was re-elected lord provost in 1869, and in 1872 received the degree of LL.D. from the University of Edinburgh. After the death of his brother, he issued a volume entitled *Memoirs of Robert Chambers, with Autobiographic Reminiscences*. During his second term as lord provost of Edinburgh he inaugurated a restoration of the High Kirk of that city, originally called St. Giles Cathedral. The work was completed in 1880, and Mr. Chambers wrote a history of the cathedral as preface to a series of lectures on *The Scottish Church* (1881). He died in London, May 20, 1883. His chief claim to grateful remembrance lies in his successful effort to provide and diffuse literature of an instructive character and pure moral tone.

CHAMBERSBURG, a borough of Pennsylvania, county-seat of Franklin county, situated in the beautiful and fertile Cumberland Valley, and on the East Branch of Conococheague Creek. It is also on the Cumberland Valley Railroad, 52 miles west-south-west of Harrisburg. It is substantially built, has good county buildings, an academy, two banks, three weekly newspapers, railway-shops, prosperous manufactures of castings, flour, farm-implements, paper, woollen, furniture, and other goods. Chambersburg is the seat of Wilson College for young ladies, a Presbyterian institution. A large part of the town was burned by the Confederate forces in 1864. Population, 8006.

CHAMBORD, Henri Charles Ferdinand Marie Dieudonné d'Artois, Comte de (1820-1883), was born in Paris, Sept. 29, 1820. His father was Charles Ferdinand, duc De Berry, second son of the comte D'Artois (afterward Charles X.). Until the revolution of 1830 he was known as the duc De Bordeaux—a title given him in compliment to the zeal displayed by that city in behalf of the Bourbon family in 1814. In July, 1830, Charles X. abdicated in favor of his grandson, with the consent of the dauphin, but the duc D'Orleans was called to the throne by the people. The young prince then went into exile, and was thenceforth known as the comte De Chambord, taking his title from his estate near Blois, which had been presented him by a Legitimist subscription. He resided for some years in Scotland and Austria, but in 1845 took up his residence in London. In November, 1846, he married Marie Thérèse Beatrice Gaëtane, the eldest daughter of the duke of Modena, but had no children. After 1850 he went to live at the castle of Frohsdorf, near Vienna. He adhered to the ancient maxims and ideas of his family, and claimed the throne of France by divine right. He was a strict Roman Catholic, and entirely devoted to a theocratic reactionary policy. After the fall of the empire, in 1870, he issued several manifestos to the French people. One of these, dated May 8, 1871, concluded with the famous phrase, "La parole est à la France, et l'heure est à Dieu." In a later one he renounced the title of Chambord, and signed himself "Henri." The wits of Paris retorted by calling it his suicide. He refused to abandon the white flag of the Bourbons and adopt the national tricolor. The Legitimists and Orleanists constituted for a time, under MacMahon's administration, the majority of the National Assembly, and were disposed to unite in raising him to the throne; but their designs were frustrated by his refusal to make any concessions or compromises. In July, 1883, when believed to be at the point of death, he sent for his cousins, the Orleanist princes, and declared the comte De Paris his successor. He died at Frohsdorf, Aug. 24, 1883.

CHAMPAGNE. See Wines.

CHAMPAIGN, a city of Champaign co., Ill., is 128 miles S. of Chicago, on the Illinois Central Railroad, and 118 miles W. of Indianapolis, on the Indianapolis, Bloomington, and Western Railroad; it is also on the Wabash, St. Louis, and Pacific Railroad. It has two banks (one national), six hotels, three weekly newspapers, twelve churches, a female seminary, and other schools. The city is lighted with gas and has a park. Its industries comprise a flour-mill, twine- and bagging-factory, sugar- and glucose-works, a machine-shop, a foundry, two furniture-factories, manufactures of barrels and carriages, and a hay-press. It was settled in 1854 and incorporated in 1858. Its property is valued at $5,231,000; its public debt is $20,000, and its yearly expenses are $15,000. The population, about three-fourths of American birth, in 1890 numbered 5827.

CHAMPFLEURY, the assumed name of Jules Fleury, a French novelist and general writer. He was born at Laon, Sept. 10, 1821, and after receiving an academical education, for a time assisted his father, who was secretary of the municipality. Then removing to Paris while still quite young, he was employed in a bookstore, and in the course of time formed an intimate acquaintance with other young men of literary tastes and aspirations. He wrote stories and sketches for various journals, and for a year or two engaged with enthusiasm in the strange task of preparing plays for rope-dancers. His story, *Chien-Caillou* (1847), was quickly pronounced by Victor Hugo a masterpiece. His *Confessions de Sylvius*, which soon followed, was a picture of the Bohemian life of Paris at that time, and to some extent autobiographical. He has since published other recollections of his early friends in his *Souvenirs et Portraits de Jeunesse* (1872). Among his novels may be mentioned *Les Oies de Noël* (1852), *La Succession le Camus* (1857), *La Mascarade de la Vie parisienne* (1860), *La Pasquette* (1876). In all he has adhered steadily to his rule of presenting a faithful picture of life and manners, provincial or Parisian, free from artistic exaggerations. His volume on *Le Réalisme* (1857) was a defence of himself as well as of his friend Courbet, who had adopted the same views in regard to painting. Champfleury's strict fidelity to facts cost him an infinite deal of pains. He studied thoroughly every character, class, and period he had occasion to depict. In due course he became the acknowledged chief of a realistic school, though his successors have pushed to an extreme the principles he first exemplified. His examination of popular tastes and customs led him into another department of literature, in which he published first the *Chants et Chansons populaires des Provinces de France* (1860), then a volume of investigation in regard to the *Legende du Bonhomme Misère* (1861). These studies of popular literature led him soon after to undertake a complete history of caricature in France. The fi volu (· *cature ancienne*, was published in

tracing the progress of this branch of art in the Middle Ages and under the Renaissance, the League, the Revolution, the Empire, and the Restoration. The fifth volume, *Caricature moderne*, treats of three principal types; and two volumes on the works of Henry Monnier and Daumier, published in 1879, complete the work. A singular and characteristic book on cats, *Les Chats* (1868), produced in the mean time, was honored with a medal by the Paris society for the protection of animals. Another direction in which Champfleury has been active is in ceramic art. His first publication on this subject was *Histoire des Faïences patriotiques sous la Révolution* (1867), which was followed by *Histoire de l' Imagerie populaire* (1869). In 1872 he was appointed by M. Jules Simon keeper of the ceramic museum at Sèvres. This position he retained until his death at Paris, November 9, 1889. In 1881 he published *Bibliographie céramique*, giving an account of all works on pottery and ceramic art that have appeared in Europe and the East since the sixteenth century. His latest work is *Les Vignettes romantiques* (1882), an illustrated volume on the art and literature of 1830.

CHAMPLAIN, a lake of North America lying between the States of New York and Vermont, and extending beyond their northern boundary a short distance into Canada. It was called by the Indians "The Lake which is the Gate of the Country"—a very appropriate name, since it lies in the basin between the Adirondacks on one side and the Green Mountains on the other. The strategic importance of this lake was discovered by the explorer Samuel de Champlain, governor of Canada, who traversed its waters in 1609 on his way to destroy the Iroquois. The lake was called "Corlear's Lake" by the Iroquois, who thus honored a favorite Dutch governor. Its length from north to south is 126 miles (about 105 in direct line). The breadth varies from 40 rods to 15 miles, the widest unobstructed portion being ten miles in breadth; the southern portion is a mere channel through a marsh. There are about fifty islands of various sizes, the larger ones being at the northern end. According to Emmons its greatest depth is 600 feet. The principal rivers or the Vermont shore are the Otter, the Winooski (or Onion), the Lamoille, and the Missisquoi. On the New York shore the rivers are the Saranac, the Chazy, the Au Sable, and Wood Creek. The latter streams abound in scenery of the most romantic character, the western shore being very precipitous. There are on this shore large deposits of iron-ore. The Vermont shore is more fertile, owing to the marbles and other limestone rocks, that enrich the soil by disintegration. The Champlain Canal, on the south, gives access to the Hudson River, and the outlet—the Richelieu River—on the north gives access to the St. Lawrence River. The surface of the lake is about 90 feet above tide-water. Salmon, trout, pike, and other varieties of fish are found in great numbers. The chief towns are Burlington, in Vermont, and Plattsburg, in New York. Lines of steamers run to the various points on the lake during the season of navigation.

Lake Champlain has a history that far surpasses that of any other American lake in interest. As early as 1666 there were French forts along its shores, which threatened the Dutch settlements at the south, the French having claimed the territory on which the latter were built. Many expeditions were fitted out both by the French and by the English successors of the Dutch, and the usual route was by this lake, as it afforded the easiest method of transporting artillery. The portages between Albany and Montreal aggregated only 12 miles. The French forts at Ticonderoga and Crown Point, on the New York shore, were the cause of constant irritation to the English, and finally they were won by the latter as the result of the disasters which caused the French to lose all Canada, in 1759. These two forts were allowed to fall into decay, but they were in the hands of both the Americans and the English during the war of the Revolution; since that time they have never been kept in repair. This was the route taken by the American general Montgomery on his way to Quebec in 1775. Lake Champlain is noted for two naval battles. On the 11th of October, 1776, the Americans, with eighty guns, under Benedict Arnold, met the British, with ninety guns, under Captain Pringle. The first day's encounter was a drawn battle. During the night the American vessels retreated. On the following day the British vessels overtook the runaways and defeated them. The second battle was on the 11th of September, 1814, when the British fleet, with ninety-five guns, under Com. George Downie, were overcome by the American fleet, with seventy guns, under Com. Thomas McDonough. The result of this victory was that the British army was forced to retire to Canada, and to abandon its mission of subduing the whole country as far south as the city of New York. (F. G. M.)

CHAMPLIN, James Tift, D.D., an American clergyman and teacher, born in Colchester, Conn., June 9, 1811, graduated with honors at Brown University in 1834; was an instructor in that college 1835–1838; pastor of a Baptist church at Portland, Me., 1838–41; professor of ancient languages in the college at Waterville, Maine, 1841–57; and president of the college 1857–72. He published an edition of *Demosthenes on the Crown* (1843), *Demosthenes' Select Orations* (1848), *Æschines on the Crown* (1850), *First Principles of Ethics* (1861), *A Text-Book of Political Economy* (1868), also an *Intellectual Philosophy*, Greek and English grammars, a translation of Kühner's Latin grammar, and other educational works, including an edition of Butler's *Ethics*. He died March 15, 1882.

CHANCELLORSVILLE, a place in Spottsylvania county, Va., near the Rappahannock River, about 50 miles south-west of Washington and 11 west of Fredericksburg. It is noted as the scene of a battle fought May 2–4, 1863, between the Union army under Gen. Joseph Hooker and the Confederate army under Gen. R. E. Lee. After Gen. A. E. Burnside had failed in his attack on Fredericksburg, Gen. Hooker had been appointed to the command of the Army of the Potomac, Jan. 26, 1863. By his judicious measures its *morale* was restored and its reorganization effected. At the end of April it contained 131,491 men and was divided into seven corps: First, under Gen. J. F. Reynolds; Second, Gen. D. N. Couch; Third, Gen. D. W. Sickles; Fifth, Gen. G. G. Meade; Sixth, Gen. John Sedgwick; Eleventh, Gen. O. O. Howard; Twelfth, Gen. H. W. Slocum. The cavalry, which numbered 11,541, was commanded by Gen. George Stoneman, and the artillery, which comprised 400 guns, was under the direction of Gen. H. J. Hunt. The Confederate Army of Northern Virginia chiefly lay in its entrenchments on the heights above Fredericksburg, though there were strong earth-works guarded by sufficient detachments along the Rappahannock from the confluence of the Rapidan to Skinker's Creek, a distance of twenty-five miles. Gen. James Longstreet, with the greater part of his corps,

had been sent to Petersburg: but two of his divisions, under Gens. Anderson and McLaws, numbering 17,000 men, formed Gen. Lee's left wing, while on the right was the Second Corps, under Gen. T. J. Jackson (immortalized as "Stonewall"). This corps of 33,400 men had four divisions, commanded by Gens. A. P Hill, D. H. Hill, Trimble, and J. A. Early. The artillery comprised 170 pieces and 5000 men. The cavalry, under Gen. J. E. B. Stuart, amounted to 2700 men, and was actively employed on the left as far as the Orange and Alexandria Railroad. The total of Gen. Lee's forces was thus less than 60,000 men. The impracticability of attacking him in front had been so decisively proved that when the time for action came Gen. Hooker determined to turn his left flank, while making also a vigorous demonstration on the right. As a preliminary, he ordered his entire cavalry, except Pleasonton's brigade, to set out April 13, and, crossing the river west of the Orange and Alexandria Railroad, to push down to Gordonsville and finally cut Lee's communications with the Confederate capital. A sudden rise in the river on the 16th prevented this, so that the cavalry remained idle till the 27th, when the movement of the infantry began. Gen. Howard then led the way with the Eleventh Corps to Kelley's Ford, 15 miles above this junction of the Rapidan, and the Twelfth and Fifth Corps followed. On the 29th these three corps, under the command of Gen. Slocum, had crossed and were marching back on the south side, while Gen. Stuart, thinking that the movement was toward Gordonsville, took post accordingly, and did not try to prevent the crossing of the Rapidan until it was too late. On the same day the First, Third, and Sixth Corps crossed below Fredericksburg, under the command of Gen. Sedgwick. This movement was intended only as a demonstration, but Sedgwick had orders to carry the enemy's works if a large force should be detached in the opposite direction, and to pursue them if they should retreat toward Richmond. Gen. Slocum reached Chancellorsville on April 30 at 2 P.M. with 40,000 men, and Gen. Couch, who had been waiting until the United States Ford was uncovered, crossed there with the divisions of French and Hancock, and arrived the same evening. The Chancellor house, where Gen. Hooker now established his headquarters, was a large brick mansion in a clearing in the eastern part of the tract known as the Wilderness, and with its outbuildings constituted Chancellorsville. Throughout this region the original forests had been cut down for fuel for iron-furnaces, and a dense secondary growth of pines and scrub covered the scanty soil. From Orange Court-House to Fredericksburg ran an old turnpike road, which had been supplemented by a plank road nearly parallel. For a mile and a half west of Chancellorsville the plank road occupied the line of the turnpike, but to the east they diverged, again reuniting about seven miles from Fredericksburg. Another road ran northeast from Chancellorsville, then turned to follow the course of the river, and touched it at Banks's Ford, four miles west of Fredericksburg.

Gen. Hooker, on the evening of April 30, issued a congratulatory order to his troops on the success of the movement. In fact, Lee's army was in a serious predicament. Sedgwick and Reynolds threatened it on the right below Fredericksburg, while Hooker with four corps was on his left flank, kept back only by Anderson's force, which he outnumbered more than two to one. Gen. Stuart had sent to Lee information of the march and size of Hooker's columns, and on that night set out to report in person to his chief. Encountering part of Pleasonton's cavalry, however, he was obliged to bring up his brigade before he drove them back. Lee perceived that the main attack was to be on his left, and promptly decided to advance to meet it, leaving Gen. Early with 8500 men to defend the strong works on Fredericksburg Heights, while McLaws was sent forward to sustain Anderson. The latter had taken position on the crest of a hill, about two miles east of Chancellorsville, where Gen. Lee ordered entrenchments to be made. Gen. "Stonewall" Jackson, who had held the extreme right of the Confederate defences, was directed to march with his corps to meet Hooker's attack. Arriving at the front on Friday, May 1, at 8 A.M., he ordered an immediate advance. On the north side of the Rappahannock, Gen. Sickles had made a parallel march, entirely concealed from the Confederates, and arrived at Chancellorsville at 9 A.M. Hooker, after reconnoitring the ground toward Fredericksburg, sent Meade at 11 A.M., with two divisions, along the river-road toward Banks's Ford, while Sykes and Hancock with their divisions advanced along the turnpike and the corps of Slocum and Howard along the plank road. Sedgwick also was ordered to threaten an attack from below, but the orders arrived too late to have any effect on the movements of the day. On each of the roads the enemy was encountered, and though Sykes's column, which was the most advanced, was for a time outflanked, it was speedily relieved by Hancock. Everything was progressing favorably for Hooker's plans, yet before 2 P.M.—the time he had fixed for the junction of the advancing columns—he sent peremptory orders for them to retire to Chancellorsville. This abandonment of his forward movement was depressing to the soldiers at that time, and has been condemned by all the generals engaged in it, and by all military critics since that time. There was every reason to push on both to secure Banks's Ford, thus bringing the two parts of the Union army nearer together by six miles, and also to fight, if there must be a battle, outside of the highly-disadvantageous ground of the Wilderness. The day was wasted, however; and Hooker, forfeiting all the superiority gained by his advance and surprise of the enemy, withdrew to act on the defensive. His troops were massed along the roads leading from Chancellorsville, his line somewhat resembling the letter J. At the top, or extreme left, stood Meade; then came Couch's division, reaching to Chancellorsville. Slocum's and Sickles's corps occupied the curve, and Howard the extremity on the right, at Dowdall's tavern, where the roads diverged. Hancock was at some distance east of the Chancellor house, his line crossing both the river-road and the old turnpike.

Gen. Lee approached this part on Friday evening, and found the Union position too strong to be assailed in front; but Jackson suggested a thoroughly characteristic movement with his whole corps across Hooker's front and around his right flank, which was the only weak point of the Union line, being, in military phrase, "in the air"—that is, without any natural or artificial support. Though such a separation of his forces was condemned by the strict rules of military science, yet Lee, seeing that Hooker had already shrunk back from fighting an offensive battle, and trusting much to Jackson's never-failing energy, gave him full permission to carry out his scheme. On Saturday morning, then, Jackson moved westward by a wood-road, keeping his

march as much concealed as possible, and using Stuart's cavalry to feel the Union lines. In passing Welford's Furnace, however, his column came in full view of Sickles's troops, which had been pushed out near the road to the Furnace. From this time on there were frequent indications of Jackson's movement, but it was generally interpreted as a retreat to Gordonsville. Sickles had soon driven the Confederates from the road, and Birney pushed on to the Furnace, where he captured an entire Georgia regiment. About noon Sickles reported that he could make a flank attack on Jackson, and later he obtained the assistance of Pleasonton's cavalry, while Williams's division from Slocum's corps, and even Barlow's reserve brigade from Howard's corps, were sent to support this movement, which, however, was greatly delayed by marching through swamps and woods. Immediately after the first attack, Jackson's trains had turned off on a side-road, which was speedily made available for their passage, and continued on their way without further interruption.

Early in the morning Gen. Hooker had inspected all his lines and pronounced them strong, but at 9.30 A. M. he sent a circular to Slocum and Howard, stating the probability of Jackson's intending to attack the right flank of the Union army and calling attention to the need of extra defences there. Gen. Howard, whom this warning especially concerned, certainly did not take sufficient precautions to meet the possible flank attack, and only two regiments faced in the direction by which the enemy actually came. Howard's division commanders, in the course of the afternoon, notified him that the enemy were massing in the woods beyond, but both Howard and Hooker seem to have dismissed all apprehension of an attack from this quarter. Gen. Barlow, whose brigade formed Howard's reserve, was withdrawn and sent to support Sickles, who reported that he was fighting the main body of Jackson's troops. But the actual result of Sickles's well-meant advance was to leave a gap of two miles in the Union lines, and fatally to weaken the right.

The increasing frequency of minor attacks toward the Union right had not dispelled the delusion that Jackson was retreating, and at 4 P. M. that wary general had reached the position which he selected as most favorable for his purpose. He had crossed the Orange plank road, by which he might have reached Howard's right, and had gone on to the turnpike which brought him in from the north-west. His troops were formed perpendicularly to the turnpike on each side, Rodes's and Colston's divisions leading, while A. P. Hill supported them and covered both roads. Thus, with his lines overlapping the doomed Eleventh Corps, Jackson advanced through the woods without sending out skirmishers. At 6 P. M. the Union soldiers were scattered through their camp preparing supper, when the Confederates burst from the woods and with a fierce yell dashed against the little handful that confronted them. Gen. Devens bravely exerted himself to stem the irresistible shock, and, though soon wounded, ordered up his reserves; but they also were swept away. Even three regiments which Gen. Carl Schurz had posted north of the turnpike, facing west, were also driven back in utter confusion. Buschbeck's brigade formed behind a slight entrenchment which had been thrown across the road, and with his artillery gave some check to Jackson's headlong career.

The stream of fugitives had already reached Chancellorsville before Hooker was roused to activity. Berry's brigade was now ordered to form across the main road and drive back the enemy. From the artillery of the Eleventh and Twelfth Corps some guns were gathered, and, being planted under Warren's direction, prevented Jackson's further advance along the road. Meantime, Sickles had been recalled, and Pleasonton, with his cavalry, on reaching Hazel Grove clearing, found it filled with a dense mass of struggling fugitives. By a cavalry charge and the effective handling of some guns, but especially owing to the loss of organization produced by their rapid advance through the woods, Jackson's men were compelled to pause, their army having been broken up by its very success. Gen. Lee, as soon as he heard Jackson's guns, made sufficient attack from the opposite side to prevent reinforcements being sent, yet Meade, on the extreme left, was undisturbed.

After night had set in, Jackson, feeling the necessity of withdrawing the troops which had made the attack, that they might reform their lines, ordered A. P. Hill to the front; then with some staff-officers he rode forward beyond his lines to reconnoitre. On his return his party, being mistaken for Federal cavalry, was fired upon by his own men, and he himself wounded. He was carried to the rear, and died a few days later of pneumonia brought on by his injury. Such was the end of one of the most remarkable characters of the war—a revival in the nineteenth century of the English Puritan soldier of the seventeenth.

Gen. Sickles during Saturday night made an attack on Jackson's troops, but finally retired to Chancellorsville. Reynolds's (First) corps came up from the north side of the Rappahannock the same night, but, though they were fresh and eager for fight, they were detained to guard the fords. The Eleventh Corps had been sent to the extreme left to reorganize, and Meade moved closer to Chancellorsville. These three corps were left unemployed during the battle of Sunday.

Anderson, whose division was on the left of the Confederates that remained with Lee, had steadily worked around toward Jackson, and his endeavors to effect a junction were facilitated by the withdrawal of Sickles. Gen. Stuart quickly occupied the crest near Hazel Grove with artillery, which in the battle following poured a destructive fire on the new line of the Union troops at Fairview, a crest half a mile west of Chancellorsville. Early on Sunday morning the assault was renewed in three columns, and the Union defences both north and south of the plank road, the latter being manned in part by raw troops, were quickly taken by Jackson's veterans, burning to avenge his loss. After a severe struggle the Union troops were finally compelled to fall back to a new line at Fairview Heights, half a mile west of Chancellorsville. The artillery at Hazel Grove, well served by Walker, now began to tell on the Union lines, and inflicted the severest losses of the day. In resisting Stuart's repeated assaults on the Union right centre, Williams had exhausted his ammunition, and could no longer hold his ground. Birney, of Sickles's corps, had steadily supported him, but was now reduced to the same strait. Sickles sent repeated and urgent demands for reinforcements, but about that time a chance ball struck a post against which Hooker was leaning, on the porch of the Chancellor house, and he fell stunned. Before he recovered sufficiently to give orders the Union troops were driven completely back to the Chancellor clearing, where again the veterans trained by Jackson displayed the pertinacity of their leader. Hooker on his recovery ordered the Chancellor

house to be relinquished to the enemy and new lines to be formed at the White house, about half a mile north of the former.

Though the Confederates had thus at last gained the central point, so exhausted were they at the time that Gen. Sickles took, instead of losing, men and material, and in his report says that "if another corps, or even 10,000 men, had been available on that part of the field, I believe the battle would have resulted in our favor." And yet there were within easy reach three corps—Meade's, Reynolds's, and Howard's—which had scarcely a man engaged in the fight; while Meade, on behalf of himself and Reynolds, had expressly asked for leave to take part. The disaster was not owing to lack of courage on part of the soldiers, but to lack of generalship on part of the commander. On the opposite side never did troops fight better than those hardy veterans whose leader had been snatched from them by remorseless fate. Through tangled woods, against well-constructed field-works, through death-dealing artillery fire, they toiled, and when their ammunition was gone pressed on with the bayonet till they had won the desperately-contested field.

But the fighting was not all on the Union right; on its left centre, where Geary was posted facing to the south, Anderson pressed on. At 9 A. M., Geary found his position exposed to the fire of Stuart's artillery at Hazel Grove and his flank threatened by Stuart's line of battle, and after making all the resistance possible retired. Then Stuart and Anderson, having effected a junction, began to fortify their position south of the Chancellor house. Stuart's troops, having been fighting and marching continuously since Thursday morning, were exhausted, and made no attempt to molest Hancock, whose position to the east they outflanked. Hancock had steadily confronted McLaws and Anderson, and was the last of the Union commanders to retire to the new lines, which he did in safety.

One part of Gen. Hooker's plan had been that Gen. Sedgwick, after crossing the Rappahannock, should attack Gen. Lee in the rear, and, although he himself had failed to make the attack in front, he insisted the more that Gen. Sedgwick, who had about 22,000 men, should execute this part of the plan. On Saturday evening Gen. Sedgwick started by the Bowling Green road, leading south, but was afterward ordered to march on Fredericksburg. Gen. Early, who held the Heights of Fredericksburg with 8500 Confederates, had on Saturday morning started out to join Lee, but had returned. Sedgwick's advance cautiously entered the town about daybreak on Sunday, but were assailed from behind a stone wall. The Union general Gibbon, who had so far lain at Falmouth, now crossed directly in front of Fredericksburg and joined Sedgwick's right. Warren, who had come directly from Hooker's headquarters, reconnoitred the ground toward the Heights; at every part it was found that the enemy's batteries bore on the approaches. It was decided then to make the assault on an extended line, so that the enemy's force could not be concentrated at any point. The troops were properly disposed, and moved gallantly to their work. On the left three storming columns carried Cemetery Hill, then faced to the right and assisted the other storming party, who had advanced directly from the city, in taking Marye's Heights. The loss of the Union troops was very heavy, but the chief object was gained. Early's force was cut in two, the main part being left below the town, where they might have been crushed had not Sedgwick's orders required him to move in the opposite direction.

Sedgwick, for insufficient reasons, delayed his march till 1 P. M. But, even had he moved with the utmost promptness, the battle of Chancellorsville had been decided while he was gaining the Heights of Fredericksburg. After some resistance to Sedgwick's march, Wilcox fell back to Salem church, about a mile south of Banks's Ford, where McLaws, sent out by Lee with four brigades, had taken a strong position. The church and schoolhouse, forming a salient on the right of the Confederate line, were sharply contested.

While Hooker had sent word to Sedgwick that he must rely on himself, Lee, divining Hooker's intention to remain inactive, sent Anderson back to reinforce McLaws. Gen. Early, too, having been informed of Sedgwick's movement, returned and took the Fredericksburg Heights, where only a handful of troops had been left, and then followed Sedgwick, hoping to reunite the Confederate forces. Thus Sedgwick was surrounded on three sides, while the road to Banks's Ford offered but a precarious line of retreat. At 9 A. M. on Monday he sent a full account of his situation to Hooker, and was directed to hold his position, or at least the south side of the ford, as Hooker intended to renew the advance the next morning. Sedgwick still urged that permission should be given to him to cross the river by night, and additional bridges for this purpose were laid. Keeping the ford at his back, he formed his troops on three sides of a square—Howe on the left, Brooks on the front, and Newton on the right. Both Early and McLaws had already, from opposite sides, made unsuccessful attempts to capture the ford. During the afternoon Lee, again venturing to profit by Hooker's inertness, left Jackson's old corps of less than 20,000 men to hold in check four times that number, and moved with the rest of his troops against Sedgwick. At 6 P. M. he had fully completed his arrangements for attack, and especially directed that efforts be made to break the centre of Sedgwick's line and thus scatter the whole force. Darkness, however, was already coming on, and a fog from the river increased the obscurity. The movements, therefore, were made separately, the chief attack being by Early against Howe's line, which was rendered weak by its length; but the onset was bravely and skilfully repulsed. By these fierce and determined attacks, Sedgwick was confirmed in his opinion of the necessity of recrossing the river, and during the night, having sent several despatches to Hooker, at last obtained from him a reluctant consent. As soon as the enemy discovered the movement they directed their batteries toward the bridges and the river-banks. Sedgwick went into camp on the north side, keeping a guard near the ford. The Sixth Corps had lost heavily in killed and wounded, but suffered no other detriment; it even brought off over a thousand prisoners.

Gen. Lee, having thus completely succeeded in his immediate object—that of driving Sedgwick over the river—was able again to turn his whole attention to Hooker, who remained nerveless and listless near Chancellorsville. On that night, indeed, Hooker, who had predetermined on a retreat, called a conference of his corps commanders, who were unanimously in favor of a renewal of the attack, except Sickles, who took the ground that the state of political affairs did not then allow even the risk of another defeat. Hooker's determination was unchanged, and Gen. Warren prepared a new line for the army, protecting the United States Ford. On Tuesday evening the artillery began to cross, although a heavy rain had set in, and a few hours later a sudden rise in the river took place. The

crossing, however, proceeded without interruption, and was accomplished by 8 A.M., May 6. Lee had already exhausted his ammunition, and made no serious attack on the troops, which thus escaped a still more dreadful catastrophe. Hooker on returning to the position he had occupied during the winter issued a boastful order inconsistent with the plain facts, while Lee, with that true religious feeling which characterized his whole career, thanked his soldiers for their heroic conduct, but ascribed the victory to God. The losses of the campaign, according to the official reports, were, on the Union side, 17,197, of whom 4601 were from the Sixth Corps (Sedgwick's) and 4039 from the Third Corps (Sickles's); on the Confederate side, 13,019, of whom 8292 were from Jackson's corps.

The column of cavalry which had set out under Stoneman on April 27 crossed the Rappahannock on the 29th, and then divided, Averill being directed to push to Culpeper Court-house, while Stoneman moved southward and crossed the Rapidan. Averill was dilatory in his movements, and his command was afterward given to Pleasonton. Stoneman, after reaching Louisa Court-house, dispersed his forces. The smallness of the detachments prevented their doing much damage; minor bridges were burnt, the Virginia Central Railroad was broken up for several miles, but the Fredericksburg and Richmond Railroad—which was the main route of Lee's communications, and the destruction of which was the principal object of the expedition—was left almost intact. When the six days' rations with which he had started were consumed, although the whole country in the rear of the Confederate army was open to invasion, Gen. Stoneman began to return, and on May 6 he recrossed the Rappahannock. The slight damage wrought by his troopers was speedily repaired, and the raid had no practical effect. (J. P. L.)

CHANCERY. The functions of a court of chancery have been discharged in the United States at different times in various ways.

See Vol. V. p. 338 Am. ed. (p. 389 Edin. ed.).

Prior to the Revolution no trace of the exercise of equitable jurisdiction can be found in the province of New Hampshire. In Massachusetts the general court seems in the earliest times to have acted as a court of chancery. In 1685, however, the court freed itself from the performance of these duties, imposing them upon the magistrates in each county. In 1692 an act was passed whereby the governor and council were vested with the powers of a court of chancery. In 1694 this act was repealed, and equitable powers were vested in a new tribunal, to consist of three commissioners appointed by the governor, who were to be assisted in their labors by five masters in chancery. For some cause this act was obnoxious to the home authorities, and it was accordingly disallowed by the royal council. From this period until the Revolution no distinct court of equity was erected in Massachusetts. The common-law courts were, however, vested with equitable powers in relation to mortgages, penalties, and some other distinctive features of equitable jurisdiction. In Rhode Island and Connecticut the powers of the common-law courts with regard to matters of equitable cognizance were in provincial times substantially similar to those exercised by the courts of Massachusetts. In Connecticut the powers with relation to penalties and forfeitures were conferred as early as 1672. In New York, New Jersey, Maryland, Virginia, both the Carolinas, and Georgia the colonial governor seems to have exercised the functions of a chancellor from very early times until the breaking out of the Revolution. In New York the power to hold a court of chancery was especially conferred upon the governor by an ordinance of the Lords of Plantations and Trade passed in 1701. Little business, however was done in this court, owing to a general dislike on the part of the public of its constitution and method of procedure. In New Jersey the governor's court of chancery was first established in 1705. In Pennsylvania the county courts had in the early days of the province a distinct equitable side in which justice was administered purely according to the principles of chancery. So distinct was this branch of their jurisdiction from their ordinary common-law powers that in several instances a county court sitting in equity reversed its own judgment previously entered while sitting as a court of law. A violent opposition to the exercise of these powers was, however, speedily developed among the colonists, and before the year 1700 the equitable functions of the court seem largely to have ceased. In 1720, Gov. Keith erected a court of chancery in the province, in which he himself, assisted by his council, presided. This tribunal did little business, but maintained a precarious existence for sixteen years, when it was finally abolished at the urgent request of the assembly. Since 1736 no separate court of equity has existed in Pennsylvania, nor until nearly the close of the eighteenth century were any equitable powers vested in the courts of common law. Several of the best recognized principles of equity were, however, regarded as imbedded in the law of the State, and justice was accordingly administered to suitors in accordance with those principles through the medium of the forms of the common law. In Delaware the early system of common-law courts with a distinct equity side, which it shared at first with Pennsylvania, was continued until the Revolution.

After the Declaration of Independence the various States in framing their constitutions differed broadly as to the wisest method of providing for the administration of equity. In New York, New Jersey, Delaware, Maryland, and South Carolina distinct courts of chancery were erected, to be presided over by a chancellor. In Virginia separate circuit courts of chancery were erected, the decisions of which were subject, however, to review by an appellate court of law and equity. A like course was subsequently pursued by the State of Michigan in framing its judicial system. In Kentucky, Tennessee, Mississippi, and Alabama distinct courts of equity have always existed. Experience has, however, shown that such tribunals are not well suited to the genius of the American people. Accordingly, in several of the States where separate courts of chancery were originally adopted they have since been abolished. Virginia discarded them in 1830, New York in 1840, Michigan in 1872, and South Carolina in 1873. The remaining States in which separate equity tribunals still exist are New Jersey, Delaware, Maryland, Kentucky, Tennessee, Mississippi, and Alabama.

By the terms of the Constitution of the United States, and of the Judiciary Act of 1789, passed in pursuance thereof, the courts of the United States are vested with jurisdiction in equity as well as at law. In administering equitable relief these courts proceed according to the course and practice of chancery, and will never interfere where there is a plain, adequate, and complete remedy at law. Somewhat similar is the method of ad-

ministering equity now in force in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, Pennsylvania, Virginia, West Virginia, North Carolina, Georgia, Texas, Florida, Illinois, Michigan, Iowa, Arkansas, and Oregon. In all these States the common-law courts are vested either by the constitution or by statute with specific equity powers, and the method adopted for administering equitable relief is more or less closely modelled upon that obtaining in the former High Court of Chancery in England. In the remaining States of the Union no distinction now exists between actions at law and suits in equity. Courts are erected which have jurisdiction over all civil causes, and codes have been passed providing for the redress of all civil injuries by one form of action. The following are the States which have adopted this course of procedure: New York, Ohio, Missouri, California, Indiana, Kansas, Nebraska, Utah, South Carolina, Louisiana, Wisconsin, Minnesota, Colorado, and Nevada.

But notwithstanding the sweeping change effected in these States, it has nevertheless been found necessary to make provision for the administration of certain equitable remedies, the absence of which would inevitably result in a failure of justice in many cases. Accordingly, injunctions and writs of *ne exeat* are issued, specific performance granted, and receivers appointed according to the practice and course of chancery, but under common-law or special statutory forms.

(L. L., JR.)

CHANDLER, ZACHARIAH (1813–1879), an American Senator, was born at Bristol, N. H., Dec. 10, 1813. After receiving a common-school education he engaged in trade, and in 1833 removed to Detroit, where he was very successful as a dry-goods merchant. In 1851 he was elected mayor of Detroit, and his energy and success in the canvass for that office caused him to be selected by the Whigs as their candidate for governor of the State in the next year, but he was defeated. He afterwards joined in the formation of the Republican party, and was elected to the United States Senate in 1856 to succeed Gen. Lewis Cass. He served on the committee on commerce, and in his two subsequent terms was chairman of that committee. He was actively concerned in all the legislation connected with the Civil War and the reconstruction of the Southern States. When his third term expired the legislature of Michigan elected a Senator less pronounced in opposition to the South, but Pres. Grant appointed Chandler Secretary of the Interior. He discharged the duties of this office with vigor and integrity. In 1876 he was president of the Republican national committee, and not only performed most arduous labor during the campaign, but when the result of the election was in dispute succeeded in having the election of Mr. R. B. Hayes recognized and proved. In 1879 he returned to his former place in the Senate, and during the autumn took part in an exciting political campaign. After making an effective speech in Chicago, Nov. 1, 1879, he was found dead in his bed.

CHANGARNIER, NICOLAS ANNE THÉODULE, a French general, born at Autun, April 26, 1793. After studying at St. Cyr, he was appointed a sub-lieutenant in 1815, and entered one of the privileged companies of the body-guard of Louis XVIII. He took part in the brief campaign of the French army in Spain in 1823, and was promoted to a captaincy in 1825. He was sent to Algeria in 1830, and distinguished himself greatly on every occasion—in the expedition to Mascara and in Gen. Clausel's campaign against Achmet Bey, and especially in his skilful fighting in the retreat from Constantina to Bona. Lieutenant-colonel in 1837 and *maréchal-de-camp* in 1840, he was made a general by the duc d'Aumale, then governor, and was vigorous in the defeat of Abd-el-Kader. Upon the overthrow of Louis Philippe in 1848 he returned to France, and offered his services to the provisional government. He was appointed minister to Berlin, but preferred to remain among the stirring and more important scenes of Paris. He gave vigorous support to the provisional government, putting down insurrections that would have overthrown it. At this time Cavaignac, then in command in Algeria, was elected to the legislature, and Changarnier was ordered thither to take his place; but, having been also elected to a seat, he remained in Paris; and when soon after the supreme power was in the hands of Cavaignac, he was placed in command of the National Guard. When Louis Napoleon was elected president he retained this command, which, with the troops in the capital, numbered 100,000 men. He was successful in keeping order during this stormy period; but as he was openly opposed to the Republic, he was watched lest he should play the part of Gen. Monk in restoring the monarchy. Although he had many friends and supporters, he was deprived of his command, and when the *coup d'état* came on the 2d of December, he was arrested in his bed in the morning, and taken to Mazas, where he was detained for several days. By a decree of the new Government, on Jan. 9, 1852, he was banished from France. He took up his residence at Malines in Belgium, refusing to return when special permission was granted. In March, 1855, he published a violent denial of the charge made by M. Véron (in his *Mémoires d'un Bourgeois de Paris*) that in 1849 he had joined in the proposal to arrest his colleagues Cavaignac, Lamoricière, and others. On the declaration of a general amnesty he returned to France, and resided on his estates. When, at the beginning of the Franco-Prussian war in 1870, he offered his services for a command in chief, they were courteously declined, but he was called by the emperor to Metz on the 8th of August. On the withdrawal of Napoleon from Metz, Changarnier remained with Bazaine, and participated in the fierce battles around that city. Upon the truce which preceded the capitulation he was sent to Prince Frederick Charles to negotiate terms. The propositions with which he was charged were—1, to be permitted to take the army to Algeria; or 2, to have an armistice, during which Metz and its forces should be revictualled, while the old imperial legislature of France should be called together and requested to form a new government to be supported by Bazaine's army. These propositions being declined and a surrender demanded, he shared the fate of the army, and was for a short time a prisoner in Germany. When peace was concluded he returned to France, and his popularity was manifested by his election to the House by four different constituencies. While in his seat he presented a summary of the events at Metz, in which he blamed Bazaine for want of method. His course as a legislator is marked by a polemic and haughty spirit, but also by candor and fearlessness. He took part in that violent opposition which resulted in the overthrow of Thiers, and was in favor of the succession of Marshal MacMahon. He was a member of the committee of nine appointed to form, if practicable, a monarchical constitution, and to find out the attitude and views of the comte de Chambord, the representative of the Bourbon line, who, it was thought, would accept a constitu-

tional compromise if permitted to ascend the throne. When the prince refused any compromise, Changarnier moved to place the executive power in the hands of MacMahon for ten years from 1873. He was elected a senator for life by the joint vote of the two houses in 1875: he died of serous apoplexy on Feb. 14, 1877. (H. C.)

CHANNING, WILLIAM ELLERY, an American poet, son of Dr. Walter Channing and nephew of Dr. William Ellery Channing, was born in Boston, June 10, 1818. His mother (of the Perkins family in Boston) dying early, he was sent in his eighth year to the Round Hill School at Northampton, Mass., where Motley the historian was one of his schoolfellows and George Bancroft one of his teachers. After further study in the Boston Latin School he entered Harvard College, where his uncle, Edward T. Channing, was professor of rhetoric; but the regularity of college-life was not to his taste, and he never graduated. In 1836 he began to write verses for the Boston *Journal*, and printed some youthful essays on Shakespeare, displaying some power as a critic. In 1839 he removed to Illinois, and lived for a year in a log cabin which he built with his own hands. In 1840 he went to Cincinnati, where he lived a studious life, and became connected for a time with the *Gazette*. In 1841 he returned to New England, married Miss Ellen Fuller, a sister of Margaret Fuller, whom he had met in Cincinnati, and fixed his residence in Concord. Mr. Emerson had printed in the *Dial* for October, 1840, an essay entitled "New Poetry," and in it said of Channing's songs: "Here is poetry more purely intellectual than any American verses we have yet seen, distinguished from all competition by two merits—the fineness of perception and the poet's trust in his own genius. The writer was not afraid to write ill; he had a great meaning too much at heart to stand for trifles, and wrote lordly for his peers alone." This praise did not seem quite justified by the extracts given, and when Mr. Channing published his first volume of *Poems* in 1843 it met with no success. Many of these poems had appeared in the *Dial* (1840–44), and he also wrote prose for that magazine. In 1844–45 he was on the editorial staff of the New York *Tribune*. In 1846 he made a brief visit to Europe, sailing up the Mediterranean, and spending most of his time in Italy. Of this journey some record occurs in his *Conversations in Rome*, published in Boston in 1847—the same year that his second volume of *Poems* appeared. This was unfavorably received, while his third volume of verse, *The Woodman* (1849), was scarcely noticed at all. He published nothing more until 1858, when *Near Home* appeared, with a dedication to Henry Thoreau. In 1855–56 he was sub-editor of the New Bedford *Mercury*, and lived in that city for a year or two. His wife died in 1856, and in 1857 he returned to Concord, where he has ever since resided. He was the most intimate friend of Hawthorne while that author lived in the "Old Manse," from 1842 to 1846, and he was also the daily companion of Thoreau in his walks and distant journeyings. In 1863–64 he began a "Life of Thoreau" in the Boston *Commonwealth*, which in 1873 he expanded into a volume and published under the title of *Thoreau the Poet-Naturalist*. This is a most suggestive biography of his friend, though lacking in method. Thoreau is also partly the subject of his poem, *The Wanderer*, published in 1871, since which time no volume of his verses has come out, but single poems have been printed in Emerson's *Parnassus* and elsewhere. Mr. Channing is a writer of vast and irregular learning, an acute critic, an odd humorist, and a poet of profound insight and delicate beauty of verse in his best passages. In other poems he is harsh, rough, careless, and even grotesque, so that he has not made that impression on the public that his rare merits deserve. (F. B. S.)

CHANNING, WILLIAM HENRY, an American clergyman, cousin of the poet W. E. Channing, was born in Boston, May 25, 1810, the son of Francis Dana Channing. He was educated in Lancaster, Mass., at the Boston Latin School, and Harvard College, graduating at the last in 1829. He studied divinity at the Cambridge Divinity School, and was ordained as a Unitarian minister at Cincinnati in 1835. During the "Transcendental" period (1838–48) he returned to New England, and preached in Boston, New York, and elsewhere; edited *The Present* and *The Harbinger*, and was connected with several experiments in Christian socialism along with Horace Greeley, George Ripley, Charles A. Dana, and Alfred Brisbane. In 1848 he was president of the Boston Union of Associationists, and in the same year published his most important work, the *Memoir of William Ellery Channing*, his uncle. He had previously written much for the *North American Review*, *Christian Examiner*, and *Dial*, and in 1840 had published a translation of Jeoffroy's *Ethica*. In 1851 he published *Memoirs of James H. Perkins*; in 1852, together with R. W. Emerson and J. F. Clarke, he published the *Memoirs of Margaret Fuller Ossoli*, and soon after a book on *The Christian Church and Social Reform*. In 1857 he went to England, and was the successor of James Martineau at the Hope Street Unitarian chapel in Liverpool for four years. Returning at an early period in the Civil War, he was settled as pastor of a small Unitarian church at Washington, but soon after the war went to England again, and has since resided mainly in London, where in 1872 he published, from Dr. Channing's manuscripts, *The Perfect Life*. He died December 23, 1884. (F. B. S.)

CHANNING, WALTER, M.D. (1786–1876), was born at Newport, R. I., April 15, 1786. He entered Harvard College in 1804, but did not graduate, leaving college in 1807 on account of some controversy with the faculty. He studied medicine in Boston and Philadelphia, receiving his degree of M. D. from the University of Pennsylvania, and afterwards studied in Edinburgh and in London. He began to practise medicine in Boston in 1812, and in 1815 was appointed professor of obstetrics and medical jurisprudence in Harvard University, continuing to serve until 1854, just before going abroad. He entered the Massachusetts General Hospital in 1821, soon after it was opened in Boston, and was one of its physicians for nearly twenty years; after which term of service he introduced the use of etherization in childbirth in that and other hospitals, and wrote a book concerning the new benefaction to surgery, *Etherization in Childbirth* (1848). This treatise, which related the history of nearly 600 cases coming under Dr. Channing's own observation, did much to make etherization common in Europe and America. He continued in practice till beyond the age of eighty, and also cultivated literature a little, publishing *Miscellaneous Poems* (1851), *A Physician's Vacation* (1856), *Reformation of Medical Science* (1857).

CHANTAL, JEANNE FRANÇOISE FREMIOT, BARONESS DE (1572–1641), known in the Roman Catholic Church as ST. JEANNE DE CHANTAL, a French religious, born at Dijon in 1572. She was the daughter

of France, president of the parlement of Dijon, and her character was very early marked by exalted devotion and zeal for religion. Married at twenty to the baron De Chantal and widowed at twenty-eight, she took a vow of perpetual widowhood, thenceforth devoting herself to the aid of the suffering poor and the instruction of her own children. In 1604 she came under the spiritual guidance of St. Francis de Sales, and with his help established at Annecy the order of the Visitation in 1610, but full papal approval was not received till 1626. Before her death at Moulins, Dec. 13, 1641, the new sisterhood had eighty-seven houses. She was beatified in 1751 and canonized in 1767. One of her grandchildren was the celebrated Madame de Sévigné. Madame de Chantal was a woman of strong and pure character. Her relations to St. Francis de Sales have been made the subject of some discussion, but nothing has ever been alleged to indicate that their mutual respect and esteem had in it any unworthy element.

CHANZY, Antoine Eugène Alfred, (1823–1883), French general, born at Nouart, in the Ardennes, March 18, 1823. At the age of sixteen he entered the navy, in which he remained but a year. Six months after leaving it he enlisted in the Fifth regiment of artillery, and was admitted to St. Cyr in 1841, from which time he passed his grades to that of captain in 1851. He was then sent to Africa, and appointed chief of the bureau at Tlemcen. As a major he was recalled, and served in the Italian campaign of 1859. As colonel of the Forty-eighth regiment of the line he was with the troops that occupied Rome in 1864. Soon after he returned to Algeria, and served during the great insurrection there; in Sept., 1868, he was appointed a brigadier-general and placed in command of two divisions of the territory. Upon the declaration of war against Prussia he returned to France and solicited a command from the minister of war; it was at first withheld, but after the revolution of Sept. 4 he was appointed in October a general of division, and thus gained the first important step in a very honorable career. In November he was placed in command of the Sixteenth corps, a part of the Army of the Loire, with which he fought valiantly at Coulmiers, and gained a decided advantage at Patay. This caused his appointment in December as commander in chief of the second Army of the Loire, with which he gained great glory. Amid almost universal disaster he achieved partial successes, especially in the second battle of Coulmiers, which caused Gambetta to say that he was "a veritable warrior revealed by events." He continued to fight against odds and obstacles, checking the enemy at Beaugency, Josnes, Marchenoir, and Origny. But for the capitulation of Bazaine he might have turned the tide of invasion; even after that fatal event he displayed great vigor and splendid fighting in retreat; during six days of continued conflict he inflicted serious losses upon the enemy, his own army losing 20,000 men. The truce being concluded with Prussia, he urged a continuance of the war, but, peace being arranged, he took an active part for the establishment of the republic. In June, 1871, he was sent to Algeria as governor-general, with the command of the military and naval forces. His administration in that province was marked by the undertaking of important internal improvements, including the construction of railroads, the establishment of meteorological stations, etc. In 1875 he was elected senator for life. In Jan., 1879, he was a prominent candidate, against his wish, for the presidency of the French republic; in February he was sent as ambassador to Russia, and in passing through Berlin was received with marked courtesy by the emperor and Prince Bismarck. This last appointment caused his retirement from the army. In 1871 he published *The Second Army of the Loire* ("La deuxième armée de la Loire"), an account of his own military operations. He died at Chalons, Jan. 4, 1883.

CHAPIN, Edwin Hubbell, D.D. (1814–1880), a Universalist minister and popular orator, was born at Union Village, N. Y., Dec. 29, 1814. He was educated at a seminary at Bennington, Vt., began to study law, but soon turned his attention to theology, and became pastor of a small congregation at Richmond, Va. Public attention was early drawn to Mr. Chapin's merits as a public speaker. In 1840 he was called to a church at Charlestown, Mass., and in 1846 to Boston, and two years later to New York. He was one of the most attractive and eloquent public lecturers in the United States. Several of his publications are of a devotional character, as *Hours of Communion*, *Crown of Thorns*, *Token for the Sorrowing*. Some are series of pulpit discourses, as those on *The Lord's Prayer and the Beatitudes*, *Characters in the Gospel*, *Moral Aspects of City Life*, *Humanity in the City*, and *The Book of Proverbs*. He considered no subject beyond the range of the pulpit, and was an earnest advocate of social reforms. In 1872 he became editor of the *Christian Leader*, the organ of the Universalists. In 1867 his congregation founded the "Chapin Home for the Aged and Infirm." He died in New York, Dec. 27, 1880.

CHAPIN, William, an eminent teacher of the blind, was born in Philadelphia in 1802. He entered early upon a literary career, was author of a *Gazetteer of the United States* (1839) and of other works, and for six years was in charge of the public schools of Yates county, N. Y. He was superintendent of the Ohio Institution for the Blind 1840–46; founder of a ladies' normal school in New York, and its principal 1846–49; and became principal of the Pennsylvania Institution for the Blind, in Philadelphia, in 1849. He prepared a report to the Ohio legislature (1846) on the benevolent institutions of Great Britain and of and Paris, and wrote the United States census report on the blind for 1860.

CHARCOAL. The United States probably consumes more charcoal than any other nation, Sweden and Russia being at present the most active rivals. Its chief uses in the United States are the production and manufacture of iron, smelting argentiferous and other lead ores, and gunpowder manufacture. Plumbers, tinsmiths, and other artisans employ considerable quantities, and in some cities it is sold and used for cooking and household purposes—not, however, to the same extent as in Paris and other European cities.

See Vol. V, p. 345 Am. ed. (p. 398 Edin. ed.).

It is impossible to form an exact estimate of the quantity annually consumed in the United States, but the amount is great, for in 1882, 697,906 net tons of pig iron and 91,293 net tons of blooms and billets were produced with charcoal, requiring nearly 1,000,000 net tons, or 100,000,000 bushels, of this fuel for the iron industry alone. The probabilities are that the total consumption of charcoal for all purposes in the United States is at least 180,000,000 bushels annually.

A large proportion of the charcoal used is still made in the woods in heaps or meilers. Beyond mere experiment no other form than the conical pile, with the wood standing on end, has been adopted in America.

aps contain from 15 to 50 cords, but 25 to 30
the e usually adopted. The wood is covered
ou which sod or dirt is placed. Fig. 1

FIG. 1.—Meiler.

the construction of a meiler. The average yield
coal in meilers is about 28 bushels per cord, but
exceptionally favorable conditions and with ex-
nary care as much as 50 bushels per cord have
ade. The ultimate practical limit of meiler-
g on a large scale is, at present, probably 35
for even with straight, solid wood the result
is always affected by atmospheric changes, as
then covering is not absolutely impervious to
r rain.

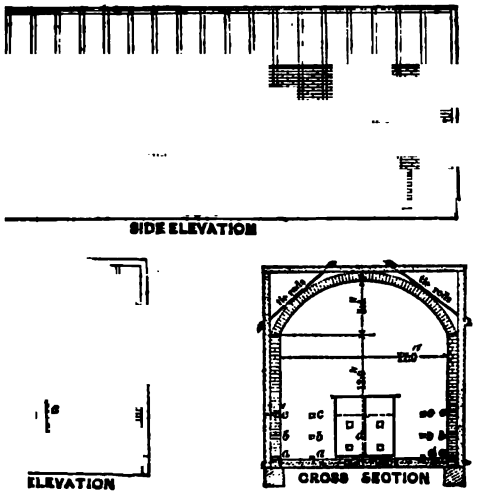


FIG. 2.—Rectangular Kiln.

s (structures of masonry in which wood is car-
) have been in use for more than twenty years,
til the last decade they have not met with
favor. They are, however, rapidly replacing
le The average yield of kilns is 40 to 45
cord, although over 50 bushels have been
Being under more perfect control, the aver-
aing of kilns can be kept within smaller limits
he carbonization in meilers. Kilns are con-
d of stone or brick, the latter being preferred,
y in size from 20 to 100 cords capacity, as also
a. They, however, can be divided into three

Rectangular Kilns.—These are generally of large
v. and consist of four vertical walls supporting
d roof, which is kept from spreading by wooden
and tie-beams. The illustration (fig. 2) repre-
90-cord kiln used in Michigan; *a*, *b*, *c* show
d is the lower door, *e* is the upper door.

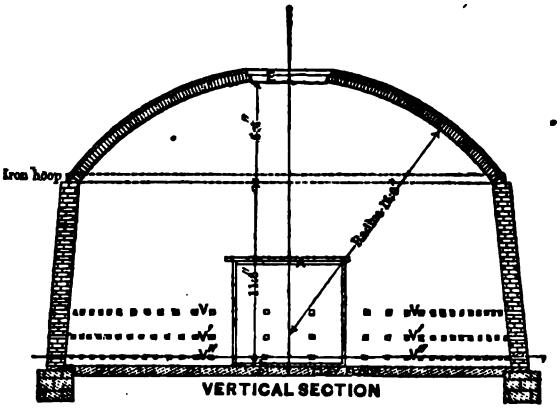


FIG. 3.—Beehive Kiln.

b. Beehive kilns rank next to rectangular kilns in average capacity. They are formed of a vertical or slightly tapering circular wall banded with iron and supporting a dome roof. Fig. 3 shows a plan and section of a 50-cord beehive kiln; the method of laying bricks and placing vents is exhibited on plan; V, V′, and V″ show position of vents.

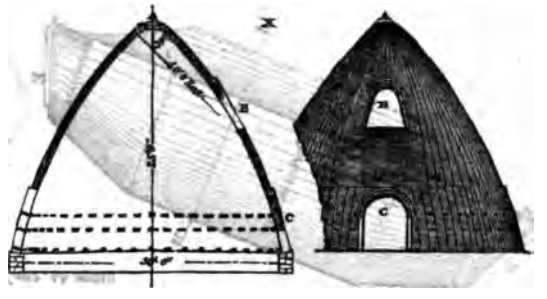


FIG. 4.—Conical Kiln.

c. Conical kilns are ordinarily of small capacity. They are conical in shape, with apex rounded. The most approved form has the sides built upon the arc of a circle of large radius. Fig. 4 represents an elevation and vertical section of a 35-cord conical kiln; A, top vent; B, upper door; C, lower door.

All kilns have one or more charging and discharging openings, about 5 feet square, and a series of vents, generally in three rows near the bottom, all around the kiln. A brick left loose in the structure is ordinarily used for a vent; sometimes iron frames and lids are inserted. A large vent with a lid or valve is often placed on the top to relieve explosions, and used to fill conical kilns closely.

The preferences for various shapes and sizes of kilns are principally local, but the following will fairly express the relative advantages: The larger kilns will give a better yield of coal per cord, because a smaller percentage of the wood is burned in carbonizing the rest; but the smaller kilns, by favoring perfect control of the carbonization, can secure more uniform results.

The conical kilns, as they require no braces or bands, are cheapest in proportion to capacity, and their size permits of locating them in nests, so as to maintain a force of employés constantly where the wood-supply would not be sufficient to operate continuously a plant

of more pretentious structures. The small kilns also can be "turned" (that is, filled, coaled, and emptied) in a shorter time than the larger kilns.

The cost of constructing kilns varies, according to size and location, from $10 to $15 per cord capacity. The conical kilns ordinarily will hold 25 to 50 cords; the beehive kilns, 35 to 60 cords; the rectangular kilns, 50 to 100 cords.

RETORTS.—The third method of manufacturing charcoal is in closed vessels, the carbonization being effected by extraneous heat; the yield of charcoal under proper treatment is approximately equal to the volume of the wood charged, 50 to 70 bushels being obtained from a cord of wood. Generally, where retorts are used, the acetic vapors arising from the carbonization process are collected, condensed, and converted into methylic alcohol, commercial acetates, and tar. The collection of the acetic vapors is not, however, confined to the use of closed vessels. A number of rectangular kilns are connected by exhausters through trunks, the acetic vapors being utilized as above described. Eighty thousand cords of wood are converted every year into charcoal by this method under Dr. Pierce's patents.

The retorts are of three general classes: (*a*) *horizontal*, either iron cylinders with one end closed by a suitable door and placed over a fireplace, or a semi-cylindrical iron bottom, forming, with a firebrick arch above it, a horizontal cylinder; (*b*) *vertical* cylinders of iron

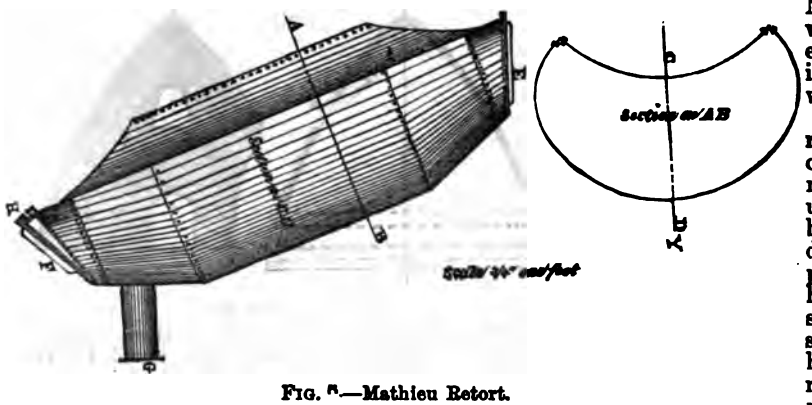


FIG. 5.—Mathieu Retort.

placed in furnaces with flues surrounding them: the cylinders are either lifted bodily out of the furnaces and allowed to cool while others are being heated, or the charcoal is drawn out by a cage within the retort; (*c*) *inclined* retorts are designed to diminish the labor of filling and emptying the horizontal form, and the most approved are crescent-shaped in cross-section, to secure practically uniform thickness of wood to be acted upon. The illustration (fig. 5) exhibits what is known as the Mathieu retort. E is the opening for filling, and F the opening for emptying, the retort; both are closed by lids suitably secured; G is the pipe to carry off the gaseous products of distillation; and H the tar-drip.

Batteries of a large number of retorts are now placed at some of the more important iron-works. Several of these plants have been erected to utilize the waste wood from large saw-mills, etc., and transform it into fuel for metallurgical purposes.

Acetic acid acts energetically on iron, but as the heat of the retorts is generally sufficient to cause volatilization, they are not destroyed rapidly.

The advantages of charcoal as a metallurgical fuel are in its purity and porosity. As used, it is mainly pure carbon, with a small percentage of ash and a varying amount of moisture absorbed from the atmosphere. Owing to its bulk and porosity, it keeps the materials in a blast-furnace from packing too closely, and its large exposed surfaces are rapidly oxidized.

Charcoal is generally bought and sold by the bushel, but the cubical capacity of this measure is by no means fixed, it varying from 1989 cubic inches to 2844 cubic inches. A number of States have fixed standards of capacity, but the laws regulating this generally provide for special contracts, and hence the standard cannot be said to be in general use. The following are the standard bushels of some of the States:

New Hampshire	1989	cubic inches =	1·151 cubic feet.
New York	2150·42	"	1·244 "
Minnesota	2419·5	"	1·4 "
Rhode Island	2481	"	1·436 "
Connecticut	2564	"	1·483 "
Massachusetts	2566	"	1·484 "
Pennsylvania	2571	"	1.488 "
Montana	2650	"	1·534 "
Missouri	2680	"	1·55 "
Maryland	2747·7	"	1·59 "
Michigan	2748	"	1·59 "

The last-named and the Winchester heaped bushel of 2688 cubic inches = 1·556 cubic feet are most in favor.

Much charcoal is now sold by weight, 20 pounds being counted as a bushel of 2748 cubic inches of mixed hard and soft woods.

The density of charcoal varies not only with the density of the wood from which it is made, but the process of manufacture. Rapidity of carbonization also affects it. Under similar conditions charcoal produced from hard woods is heavier than that made from soft woods, and that made by slow carbonization is generally heavier than that produced rapidly. The yield of charcoal per cord of wood is influenced greatly by the size and character of timber used. A pile of 4 by 4 by 8 feet is uniformly adopted as a cord, but the volume of solid wood is much greater where the sticks are large, straight, and free from projections. The following percentages of solid wood in piles was determined by the forestry department of Prussia:

For "timber"	74·07 p. c. (= 80 c. ft. per cord).
For "log (fire) wood" (over 6" diameter)	69·44 p. c. (= 75 c. ft. per cord).
For "billet" (3" to 6" diameter)	55·55 p. c. (= 60 c. ft. per cord)
For "brush" wood (less than 3" diameter)	18·52 p. c.
For "roots"	37·00 p. c.

(Vide *Journal of U. S. Association of Charcoal-Iron Workers*, vol. iii. p. 20.)

Marcus Bull, in his experiments, found 71½ cubic feet *plenum* or solid dry wood and 56½ cubic feet interstices in a carefully-piled cord of perfectly dry wood. These experiments, which were described in a paper read before the American Philosophical Society April 7, 1826,

tomized in the following table. The charring was in meilers or heaps; the bushel used approximated the Winchester standard, 2688 cubic inches. (See also Sargent's tables, in the article FUEL.)

---mes of woods coals.	Botanical names.	Specific gravities of dry wood.	Avoirdupois pounds of dry wood in one cord.	Product of charcoal from 100 parts of dry wood, by weight.	Specific gravities of dry coal.	Pounds of dry coal in one bushel.	Pounds of charcoal from one cord of dry wood.	Bushels of charcoal from one cord of dry wood.	Time 10^{o} of heat were maintained in a room by the combustion of one pound of each article.	Value of specified quantities of each article, compared with shellbark hickory as the standard.
									H. M.	*Cord.*
ash	*Fraxinus americana*	·772	3450	25·74	·547	28·78	888	31	6 40	77
tree	*Pyrus malus*	·697	3115	25	·445	23·41	779	33	6 40	70
beech	*Fagus sylvestris*	·724	3236	19·62	·518	27·26	635	23	6	65
birch	*Betula lenta*	·697	3115	19·40	·428	22·52	604	27	6	63
birch	*Betula populifolia*	·530	2369	19	·364	19·15	450	24	6	48
rnut	*Juglans cinerea*	·567	2534	20·79	·237	12·47	527	42	6	51
edar	*Juniperus virginiana*	·565	2525	24·72	·238	12·52	624	50	6 40	56
ican chestnut	*Castanea vesca*	·522	2333	25·29	·379	19·94	590	30	6 40	52
cherry	*Prunus serotina*	·597	2668	21·70	·411	21·63	579	27	6 10	55
ood	*Cornus florida*	·815	3643	21	·550	28·94	765	26	6 10	75
elm	*Ulmus americana*	·580	2592	24·85	·357	18·79	644	34	6 40	58
gum	*Nyssa sylvatica*	·703	3142	22·16	·400	21·05	696	33	6 20	67
gum	*Liquidambar styraciflua*	·634	2834	19·69	·413	21·73	558	26	6	57
rk hickory	*Carya alba*	1·000	4469	26·22	·625	32 89	1172	36	6 40	100
hickory	*Carya porcina*	·949	4241	25·22	·637	33·52	1070	32	6 40	95
eart hickory	*Carya porcina*	·829	3705	22·90	·509	26·78	848	32	6 30	81
hazel	*Hamamelis virginica*	·784	3505	21·40	·368	19·36	750	39	6 10	72
ican holly	*Ilex opaca*	·602	2691	22·77	·374	19·68	613	31	6 20	57
ican hornbeam	*Carpinus americana*	·720	3218	19	·455	23·94	611	25	6	65
tain-laurel	*Kalmia latifolia*	·663	2963	24·02	·457	24·05	712	30	6 40	66
maple	*Acer saccharinum*	·644	2878	21·43	·431	22·68	617	27	6 10	60
aple	*Acer rubrum*	·597	2668	20·64	·370	19·47	551	28	6	54
magnolia	*Magnolia grandiflora*	·605	2704	21·59	·406	21·36	584	27	6 10	56
t white oak	*Quercus prinus palustris*	·885	3955	22·76	·481	25·31	900	36	6 30	86
ak	*Quercus alba*	·855	3821	21·62	·401	21·10	826	39	6 20	81
white oak	*Quercus obtusiloba?*	·775	3464	21·50	·437	22·99	745	32	6 20	74
rub oak	*Quercus catesbæi*	·747	3339	23·17	·392	20·63	774	38	6 30	73
ak	*Quercus palustris*	·747	3339	22·22	·436	22·94	742	32	6 20	71
black oak	*Quercus banisteri*	·728	3254	23·80	·387	20·36	774	38	6 30	71
ak	*Quercus rubra*	·728	3254	22.43	·400	21·05	630	30	6 20	69
n oak	*Quercus ferruginea*	·694	3102	22·37	·447	23·52	694	29	6 20	66
chestnut oak	*Quercus prinus monticola*	·678	3030	20·86	·436	22·94	632	28	6	61
w oak	*Quercus prinus acuminata*	·653	2919	21·60	·295	15·52	631	41	6 10	60
sh oak	*Quercus falcata*	·548	2449	22·95	·362	19·05	562	30	6 20	52
n	*Diospyros virginiana*	·711	3178	23·44	·469	24·68	745	30	6 30	69
ne (soft)	*Pinus mitis*	·551	2463	23·75	·333	17·52	585	33	6 30	54
pine	*Pinus inops*	·478	2137	24·88	·385	20·26	532	26	6 40	48
pine	*Pinus rigida*	·426	1904	26·76	·298	16·68	510	33	6 40	43
pine	*Pinus strobus*	·418	1868	24·35	·293	15·42	455	30	6 40	42
w poplar	*Liriodendron tulipifera*	·563	2516	21·81	·383	20·15	549	27	6 10	52
ardy poplar	*Populus dilatata*	·397	1774	25	·245	12·89	444	34	6 40	40
ras	*Sassafras officinalis*	·618	2762	22·58	·427	22·47	624	28	6 20	59
service	*Amelanchier canadensis*	·887	3964	22·62	·594	31·26	897	29	6 20	84
re	*Platanus occidentalis*	·535	2391	23·60	·374	19·68	564	29	6 30	52
walnut	*Juglans nigra*	·681	3044	22·56	·418	22	687	31	6 20	65
whortleberry	*Vaccinium corymbosum*	·752	3361	23·30	·505	26·57	783	29	6 30	73

Analyses of Woods, by M. Eugène Chevandier.

---.	Composition.				
	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
.....	49·36	6·01	42·69	0·91	1·00
.....	49·64	5·92	41·16	1·29	1·97
.....	50·20	6·20	41·62	1·15	0·81
r	49·37	6·21	41·60	0·96	1·86
w	49·96	5·96	39·56	0·96	3·37
rage...	49·70	6·06	41·30	1·05	1·80

Percentage of Water Expelled.

Temperature.	Water expelled from one hundred parts of wood.			
	Oak.	Ash.	Elm.	Walnut.
257° Fahr.	15·26	14·78	15·32	15·55
302° Fahr.	17·93	16·19	17·02	17·43
347° Fahr.	32·13	21·22	36·94?	21·00
392° Fahr.	35·80	27·51	33·38	41·77?
437° Fahr.	44·31	33·38	40·56	36·56

The preceding table, prepared by M. Violette, shows the proportion of water expelled from wood at gradu-

ally increasing temperatures. The wood operated upon had been kept in store during two years. When wood which has been strongly dried by means of artificial heat is left exposed to the atmosphere, it reabsorbs about as much water as it contains in its air-dried state. The wood experimented on was that of black alder, or alder buckthorn, which furnishes a charcoal suitable for gunpowder. It was previously dried at 150° C. = 302° Fahr. Table I., showing the composition of charcoal, was also prepared by M. Violette.

TABLE I.—*Showing the Composition of Charcoal.*

Carbonised at—	Percentage of the solid product.				Carbon for a given weight of wood.
	Carbon.	Hydrogen.	Oxygen, nitrogen, and loss.	Ash.	
150° C.....	47·51	6·12	46·29	0·08	47·51
200°.....	51·82	3·99	43·98	0·23	39·88
250°.....	65·59	4·81	28·97	0·63	32·98
300°.....	73·24	4·25	21·96	0·57	24·61
350°.....	76·64	4·14	18·44	0·61	22·42
432°.....	81·64	4·96	15·24	1·61	15·40
1023°.....	81·97	2·30	14·15	1·60	15·30
1100°.....	83·29	1·70	13·79	1·22	15·32
1250°.....	88·14	1·42	9·26	1·20	15·80
1300°.....	90·81	1·58	6·49	1·15	15·85
1500°.....	94·57	0·74	3·84	0·66	16·36
Platinum melts.	96·52	0·62	0·94	1·95	14·47

Prof. Ledebur burned weighed quantities of charcoal at different temperatures with measured volumes of air, directly determining the amounts of carbonic acid and oxide in the products of combustion, and indirectly the quantity of oxygen consumed. The results of these experiments are given in Table II.

Red charcoal; Fr. *charbon roux*; Ger. *Rothkohle.* Sauvage found by experiments that a perfectly charred coal does not give the largest quantity of combustible matter in the smallest volume, but, on the contrary, that this relative quantity increases to a certain point of the process, and then begins to decrease. After the process had been conducted for five hours he claimed to have attained the greatest yield of combustible matter. His results are exhibited in Table III. After five and a half hours the water and acetic acid are evaporated, and the product is an imperfectly charred coal of dark-red or brown color. This product, without water and acetic acid, still contains the tar and combustible gases, both of which contribute to a higher heating capacity.

TABLE II.—*Showing the Results of the Combustion of Charcoal.*

Temperature.	Carbon burned.		Oxygen consumed.	
	To carbonic acid, per cent.	To carbon to oxide, per cent.	Consumed in combustion, per cent.	Unconsumed, per cent.
350° C.....	78·6	21·4	33·0	77·0
440°.....	72·4	27·6	80·6	19·4
520°.....	71·4	28·6	87·9	12·1
700°.....	62·6	37·4	80·3	19·7
1100°.....	1·3	98·7	100·0	0·0

TABLE III.—*Showing the Results of Sauvage's Experiments.*

	Time of charring (hours).					In the meiler.
	3	4	5	5·5	6·5	
100 weighed kilos of wood yielded.....	65·4	53	47	41·5	39·1	17·2
100 cub. m., measured respectively.....	86	76	58	55	52	33
100 cub. dec. of wood contain 3153 parts weight of combustible; 100 cub. dec. of coal yielded.....	3118	3139	4009	3849	3997	3867

The result here given for the meiler is rather low for good practice.

A company in Mainz, says Percy, prepares wood for fuel by heating it to a degree sufficient to cause incipient carbonization and change its color to reddish brown. The name *Rothholz* is given to this product. Fresenius recommends it as being easily ignited, and therefore an excellent material for lighting fires; it may be conveniently conveyed and stored, and on burning produces a copious flame and is capable of developing intense heat. Percy states that the difference in chemical composition between brown (or red), and black charcoal is of itself sufficient to prove that the former has less heating power than the latter. Brown charcoal contains more oxygen and less carbon than black. (J. B.)

CHARITON, the county-seat of Lucas co., Iowa, is on the Chariton River, 55 miles S. of Des Moines, on the Chicago, Burlington, and Quincy Railroad, with branches N. to Des Moines and S. to St. Joseph and Kansas City. It has four hotels, a national bank, a private bank, one daily and two weekly newspapers, nine churches, a normal school, and three fine school buildings with seventeen departments. It has a foundry, a railroad repair shop, plough-factory, butter tub factory, and two flour mills. It is well laid out, with shady streets, and has a park and a good fire department. It was settled in 1847 and incorporated in 1871. Its property is valued at $781,000; its public debt is $3000, and its yearly expenses are $5000. Population, chiefly of American birth, 2648.

CHARITIES, in law, are gifts and devises of land and property for general public uses, to be applied in accordance with the intention of the donor as expressed in the deed of gift or will. Such devises or gifts may be made for the relief of aged, impotent, and poor people; for the maintenance of hospitals or homes for the sick and maimed, and for disabled soldiers, seamen, and marines; for the foundation and support of schools of learning, homes for the support and education of orphans, societies for the aid and support of decayed tradesmen and actors. They may be also made to a municipal corporation for the erection of a town-house for the transaction of town business, or to a municipal corporation for the erection of a suitable college wherein

(See Vol. V. p. 34; Am. ed. p. 401 Edin. ed.).

poor orphans may be supported and educated.

The statute of 43 Elizabeth c. 4 is considered the principal source of the law of charitable uses, and has given rise to various questions upon the subject; and to the very extensive jurisdiction of the chancery all such matters are referred. This statute and its preamble designate and enumerate the uses which shall be deemed charitable; and it is now the established rule that no uses shall be deemed charitable and under the protection of the law except such as come within the word or the obvious intent of the statute. It also provides that all charities shall be inquired into and enforced by a commission issuing out of chancery. After the passage of this statute it became a vexed question whether the court of chancery could grant relief by original bill, or whether the remedy was confined to the process by commission; but in the reign of Charles II. it was decided in favor of the original bill in chancery. In England, if a bequest be for a charity, it matters not how uncertain the persons or objects may be, or whether the persons who are to take are *in esse* or not, or whether the legatee be a corporation capable in law of taking or not; the court will sustain the legacy, and give it effect according to its own principles, and where a literal execution becomes inexpedient or impracticable it will execute it *cy pres*. In former times so strong was the disposition of chancery to assist charities that in equity assets were held to satisfy charitable uses before debts or legacies, though assets at law were held to satisfy debts and legacies before charities; and this was but in conformity to the civil law, by which charitable legacies were preferred to all others. It is laid down in the books of authority that the king in England, as *parens patriæ*, has the general superintendence of all charities not regulated by charter, which he exercises by the keeper of his conscience, the chancellor; and therefore the attorney-general, at the relation of some informant, when it is necessary, files *ex-officio* an information in the court of chancery to have the charity properly established and applied. The statute of 9 Geo. II. c. 36 has very materially narrowed the extent and operation of the statute of Elizabeth.

During the dominion of the English Crown over the colonies in America these principles became a part of the system of jurisprudence here, but after the establishment of their independence some States entirely abolished the operation of the principles of mortmain, and others of whose system the statute was a recognized part modified its operation by endowing their courts with extraordinary chancery powers over charities; and now, with but a few exceptions, the laws of the States permit property to pass by will or deed for charitable uses, whether it be real or personal; and these laws have settled the vexed question whether a religious purpose was a charitable purpose by employing both terms, "religious and charitable uses." Their courts are vested, by legislative enactment or inherent common-law jurisdiction, with authority to see such devises properly executed and the intention of the donor carried into effect. As the States have the exclusive power of making and interpreting laws governing their own citizens, it becomes necessary, in order to treat fully the subject of charity, to view each State wherein that subject is the matter of jurisprudence by itself, and consider its peculiar application of the law to the subject.

In the State of Alabama the courts of chancery have jurisdiction over bequests for charitable uses by virtue of their original common-law powers, and in recognizing the validity of such, without invoking the aid of the English statute, hold that dedication to religious or public uses may be sustained, though it be limited only by the wants of the community or during the pleasure of the person making it. In Connecticut the legislature has the power of an English court of chancery over charitable devises, and may direct the sale of the real estate, though the devisee may have directed that the estate should never be sold, and in cases where the lapse of time or change in the condition of the property makes it prudent and beneficial to the charity to alien the specific lands and invest the proceeds in other securities, providing, however, that no deviation from the gift be made; and so absolute is this power that the courts of the United States have no right to revise the facts upon which the legislature has seen fit to exercise such power. Here a devise to a town directing that all the interest of the devise shall be laid out in repairing the highways and bridges of the town is a valid charitable use under the statute, as is also a devise for school purposes. In Georgia the principles of the statute of Elizabeth have been adopted and constitute a part of the law of the State, departing from it only, however, by not suffering an equitable interest to fail for want of a trustee to support it; and the superior courts have an inherent jurisdiction over bequests to all charitable uses and trusts where the same are definite and specific in their objects and capable of being executed. In Illinois the courts have adopted and administered charities upon *cy-pres* principles, only with the view of sustaining and carrying into effect the intention of the donor, but without authority to change the same; and the charity must be accepted upon the terms proposed; but if the intention of the donor becomes impracticable, it may be altered *cy pres*. In Maryland the statute of Elizabeth is not in force, but the third section of the declaration of rights prefixed to the constitution of the State goes so far as to render valid a dedication of lands to public and pious uses, though there be no specific grantee or trustee. It is held that a bequest of the income of property to be applied towards feeding, clothing, and educating the poor orphans belonging to a certain congregation, and of a certain county attending school at a certain place, is void, being too indefinite to be carried into effect. In Iowa the courts of chancery have no other than judicial power, and cannot give effect to gifts and devises in those cases where no particular object is designated and no trustee named or person appointed to select the object, and which is administered by the chancellor of England as *parens patriæ*; and if a testator ineffectually dedicates his property to charity or in such manner that the devise is void, the State possesses no prerogative to interfere and dispose of the property. In Maine the general provisions of the statute of Elizabeth are in force, but as the jurisdiction of the supreme court over such cases of trust is not derived exclusively from that statute, it is not restricted by it. When a trust is created by a bequest for charitable purposes, if the charity is definite in its objects, is lawful, and is to be regulated by trustees specially appointed for that purpose, the supreme court of the State has jurisdiction over it independently of the statute of Elizabeth, and will cause it to be executed whether the uses designated are or are not within the terms of that statute; and in cases where there is no trustee to execute the trust the court of equity will see the use executed by the appointment of a trustee for that purpose. In Massachusetts the statute law bestows upon the supreme court all the authority of a court of general chancery jurisdiction for the purposes of hearing and determining questions of devises for charitable purposes, or to permit such alterations in the mode prescribed by the donor as will best promote the general interest of the charity. In this State a gift designated to promote the public good by the encouragement of learning, science, and the useful arts, without any particular reference to the poor, is a charity, as also a gift or bequest to the poor of a particular church is a public charity. These trusts or charitable uses may be perpetuated in their duration, and may leave the mode of application and the selection of particular objects to the discretion of the trustees; also, a corporation established for the support of poor and old women, which devotes all the funds to the support of such women in its home, and is no source of income to its members, is a charitable corporation, although

it requires a payment of money as a requisite for admitting a woman to its home.' In New Hampshire a gift of real or personal estate to promote education is a charity, and the laws give and allow such charities. This principle of the law governing charitable uses was most emphatically laid down by the Supreme Court of the United States in the great case of "The Trustees of Dartmouth College vs. Woodward." This case was an action of trover brought in the State court, in which the plaintiff, Woodward, declared for two books purporting to contain the records of all the doings and proceedings of the trustees of the college from the establishment of the corporation until Oct. 7, 1816, the original charter or letters patent constituting the college, the common seal, and four volumes purporting to contain the charges and accounts in favor of the college. The college was founded by a charter granted by the British Crown dated Dec. 13, 1769. After the college had been fully established for the period of fifty years the legislature of New Hampshire passed two acts which in point of fact abolished the old corporation and established a new one. The first of these acts made the twelve trustees under the charter, and nine other individuals to be appointed by the governor and council, a corporation by a new name (Dartmouth University), and to this new corporation transferred all the property, rights, liberties, powers, and privileges of the old corporation, with further power to establish new colleges and an institute, and to apply all or part of the funds to these purposes, subject to the power and control of a board of twenty-five overseers to be appointed by the governor and council. The second act makes further provisions for executing the objects of the first, and authorizes the treasurer of the trustees of the college to retain and hold their property against their will. Daniel Webster, for the college, raised the question before the court of the validity and constitutionality of these statutes, and Chief-Justice Marshall, in delivering the opinion of the court, sustained his view, holding "that the college was a private eleemosynary institution whose funds consisted entirely of private donations; that the corporation was not invested with any portion of political power, and did not partake in any degree in the administration of the civil government. It was the institution of a private corporation for general charity. The charter was a contract to which the donors, the trustees of the corporation, and the Crown were the original parties, and it was made on a valuable consideration for the security and disposition of property. Contracts of this kind, creating these charitable institutions, are most reasonably within the purview and protection of the Constitution. That the college was not liable to the control of the legislature, and that the acts of the legislature of New Hampshire altering the charter in a material respect without the consent of the corporation was an act impairing the obligation of the charter, and consequently unconstitutional and void." This decision, according to Kent, did more than any other single act proceeding from the authority of the United States to throw an impregnable barrier around all rights and franchises derived from the grant of government, and to give solidity and inviolability to the literary, charitable, religious, and commercial institutions of our country. In North Carolina the statute of 43 Elizabeth is in force, and by virtue of it the court of chancery has jurisdiction of all charities; but a charity under this statute must be so described in the will that the law will at once acknowledge it to be such; for otherwise it reverts to the heir-at-law or next of kin. The constitution of this State does not prohibit the creation of a permanent fund for charitable purposes. In Ohio the doctrines founded upon the statute of Elizabeth, ch. 4, in relation to charitable trusts to corporations, either municipal or private, have been adopted by the courts of equity, but not by express legislation, and dedications of lands to charitable and religious purposes are valid without any grantee to whom the fee could be conveyed; such gifts to charitable uses receive the most liberal construction. In Tennessee a charity is a gift to a general public use and the maintenance of universities, colleges, academies, and common schools and other lawful institutions are charitable uses. Such provisions of the statute of Elizabeth as were the law before the enactment of that statute, and are applicable to our institutions, are in force here as a part of the common law. In Virginia the statute of Elizabeth in regard to charitable uses was repealed in 1792, but the code declares that conveyances and devises to charitable use are void. In New York the statute of Elizabeth was repealed in 1788, and the power to enforce charities is now in the court of chancery by virtue of its original constitution; but charities within the definition of that statute will be enforced even where the beneficiaries are too vaguely designated to be able to claim for themselves.

This jurisdiction rests on the understanding that such charities are trusts, and the specific intent of the donor will be enforced if it can be ascertained and does not come under the provisions of the statutes abolishing all uses and trusts except such as are authorized and modified. The prohibitions of the statute extends only to private trusts and accumulations for remote posterity. A bequest for the use of the poor of a town is not prohibited by those statutes, nor a bequest for the use of the poor ministers of an incorporated religious society. Nor do the provisions of the revised statutes concerning "expectant estates" apply to property given in perpetuity to religious or charitable corporations, as the *cy-pres* doctrine, where applied to charitable uses, has never been held in this State. A bequest for accumulation for the purpose of the erection of a church cannot be supported as an absolute gift to take effect immediately. In Pennsylvania the statute of Elisabeth concerning charitable uses does not extend, but its principles, as applied by chancery in England, obtain here by force of our own common law, and relief may be given so far as the powers of the court extend. The peculiar equities commonly ascribed to the operation of the statute are fully administered here when means are found adequate to the purpose; and in this respect the competency has been much enlarged by the laws extending the equitable powers of the tribunals; but a court of equity will not interfere with the exercise of the discretion vested in the trustee of a charity in the distribution of the fund if exercised in good faith. In the administration of a charity unreasonable or impracticable directions in the will in regard to the management of the property will be designated, on the doctrine of *cy pres*, which to that extent is recognized in Pennsylvania. The most important case establishing the doctrine of charitable uses in this country is that which came under the will of Stephen Girard, which, with that of the Dartmouth College, are the leading cases on that subject. Stephen Girard died in Philadelphia in the year 1831, leaving an estate of some $7,000,000. After sundry bequests he left by his will the real and personal residue of his estate to "the mayor, aldermen, and citizens of Philadelphia" for the purpose of constructing and furnishing a college and outbuildings for the education and maintenance of not less than 300 orphans, who might come from any part of the State of Pennsylvania, those from the city of Philadelphia to have a preference) or from the cities of New York and New Orleans, said residuary estate amounting to the sum of $2,000,000. The heirs of Mr. Girard contested the validity of the trusts by reason of the uncertainty of the designation of the beneficiaries of the legacy. They also contended that the corporation of the city of Philadelphia was not authorized by its charter to administer the trusts of this legacy, and that the intentions of the testator would be defeated by the substitution of any other trustee, and that the plan of education proposed is anti-Christian, because in said will the testator forbids a minister of any creed to preach or teach in the college; it is therefore repugnant to the constitution and laws of Pennsylvania. The provisions of the will were defended in a most masterly argument by Horace Binney of Philadelphia, and his views were sustained by the Supreme Court of the United States. It was decided that the trusts created by the will were valid, and that the city of Philadelphia under its charter is invested with powers and rights to take property upon trust for charitable purposes which are not otherwise obnoxious to legal animadversion; that the trusts mentioned in the will of Stephen Girard are of an eleemosynary nature and charitable uses in a judicial sense; that

donations for the establishment of colleges, schools, and seminaries of learning, and especially such as are for the education of orphans and poor scholars, are charities in the sense of the common law; and, finally, that the exclusion of all ecclesiastics, missionaries, and ministers of any sort from holding or exercising any station or duty in a college, or even visiting the same, or the limitation of the instruction to be given to the scholars to pure morality, general benevolence, a love of truth, sobriety, and industry, is not so derogatory and hostile to the Christian religion as to make a devise for the foundation of such a college void according to the constitution and laws of Pennsylvania. Some years after this another attempt was made by the heirs of Mr. Girard to have the trusts declared void on the ground that the act of consolidation of the city of Philadelphia was a merger of the old city in the new, and therefore the city was incapable of executing the trusts beyond that of the college. The Supreme Court, however, decided that the estate was vested by will in the city on valid legal trusts, and it was fully competent to execute; that the Consolidation Act did not destroy the identity of the city as a corporation, and it has every capacity under its new charter to hold, and authority necessary to execute, the trusts of the will. Under these plenary rulings the college, under the careful care of the city, has grown to those magnificent proportions that render it a lasting glory of philanthropy and an undying evidence of the beneficial results of charity. (F. H.)

CHARITY ORGANIZATION. This phrase, derived from the title of the "London Society for Organising Charitable Relief and Repressing Mendicity" by popular abbreviation, has come into recent use to denote a new phase of bringing the benevolent energies of the community to bear upon the social problems of pauperism and indigence.

There are three systems of relief existing in Europe: first, spontaneous and voluntary; second, sequestered endowments and voluntary contributions supervised and assisted by the civil authority; third, a poor-rate levied by taxation and administered by the officials of the state. In each case this description is more theoretical than actual, since in countries where voluntary private action is left free there are old endowments, the management of which is assumed or supervised by the civil power, and in both the other cases the state has not suppressed independent relief, and in some instances has not even sought to do so. Italy may be taken as an example of unhindered voluntary charity; state supervision of voluntary contributions, with aid from the public treasury, is characteristic of the French empire and of those provinces attached directly to the administration of the First Napoleon; Great Britain and Prussia, with the Scandinavian nations, are instances of the third system, or a poor-tax. As a rule, the United States of America have followed with general fidelity the example of Great Britain. In Prussia, Denmark, Sweden, and in Norway until 1863, the right of a pauper to claim relief from the state is distinctly affirmed by statute. While there is no legislative direction to the same effect in Great Britain, yet a poor-guardian refusing to render the prescribed legal aid to an applicant is liable to penalties for such neglect, and in some instances the pauper can enforce his claim at law.

In 1572, Parliament enacted that "rogues, vagabonds, and sturdy beggars" for the first offence were "to be grievously whipped" and seared in the right ear "with a hot iron of the compass of an inch about;" for the second, they were to be adjudged felons; and for the third, to suffer death without the benefit of clergy. The executions under Elizabeth were from 300 to 400 annually. Such severity characterized most countries of Europe until the close of the last century. Repression so stern demanded as its justification some adequate provision for meritorious destitution. In 1601 the poor-law system of England began in an act of Parliament which, while forbidding vagrancy and begging, also defined the settlement of the poor in parishes, made these responsible for the relief of their impotent and indigent, ordered the establishment of poor-houses, and authorized the levy of a poor-rate upon real and personal property. The responsibility of the parish for its own destitution and the poor-tax are the germinal elements in the law. They remained unchanged until 1834, save that in 1796 an act was passed giving color to the administration of relief, directing that it should be adequate to the support of the pauper "in a state of comfort." From this time, and simultaneously with the phenomenal increase of modern mechanical inventions, bringing with it a redistribution of population and a concentration of capital and manufactures in great towns, the burden of the taxpayer grew more onerous, until it reached £7,890,000, paid by 11,500,000 inhabitants, in 1818. In some instances the tax amounted to the confiscation of property. A commission appointed to investigate the operation of the poor-laws in 1832 reported that the magistrates were wont to have a scale of maintenance up to which they brought the income of ill-requited labor by supplementing wages with allowance from the parish, arguing that it was better to provide partial than complete support for the poor. This allowance became an element in the market-price of labor. It served to depress it and to bring the families of workingmen into deplorable wretchedness. The report led to the Poor-Laws Amendment Bill of Earl Grey's Government in 1834. Its leading provisions were the creation of a board of commissioners to inspect and regulate relief throughout England and Wales; the suppression of the authority of justices to order out-door relief; the erection of work-houses, within which work should be given according to their strength to the impotent and destitute. In these institutions husbands and wives, parents and children, were to be separated, a pauper dress to be provided. The infirm, the young, and the vicious were under the same system of discipline and disgrace. Neighboring parishes might unite under the authority of the commissioners in building a work-house.

The commercial distress which followed almost at once made it impossible to carry the amendment act into complete execution, although the agitation attending its passage so improved the administration of the poor-fund that the expenditure fell from £6,317,255 to £4,044,731 in three years. The history of this law was thus epitomized by Mr. Edward Denison in 1869: "The principle of its framers was to offer board and lodging in the work-house to all who would take it, the only further consideration being how to make the recipient's condition so uncomfortable that he would avoid it as long as he could, and get out of it on the first opportunity. Possibly, this system, thoroughly and universally enforced by able administrators, might have stamped out pauperism altogether, to the infinite advantage of the laboring class. But the law never was in harmony with public opinion, and it was very partially or negligently executed, and of course broke down. The Poor-Law of 1834 has practically been repealed long ago." Its relation to family ties may be illustrated with a single instance. Prof. Fawcett of Cambridge, England, in his book on *Pauperism*, has

shown how the provision of the state for a parish child exceeds, in the amount allowed for board, clothing, and medical care to those to whom it is indentured, the sum which an agricultural laborer could grant to a single member of an average family, and in its schooling and visitation by two ladies of the neighborhood the intellectual and moral resources of his home. He observes that the law holds out inducements to him, addressed to the most unselfish parental impulses, to abandon his offspring.

The Scotch law was assimilated to the English in 1845. Under the ancient statute of 1579 no provision was made for the able-bodied. It constituted the provosts, bailiffs, and justices of any burgh or town a commission to register the aged, impotent, and other poor in every parish, to impose a tax upon the substance of the people for their sustenance, to put them at work according to their strength, to indenture children, to license the poor to gather alms at the doors of parishioners, "so as always it be speedely appoynted and aggried how the poore of that parochin sall be susteined within the same, and not be chargeable to uthers nor troublesome to strangers." By subsequent proclamations of the Privy Council the assessment of rates and the management of the poor-fund was committed to the magistrates of the towns and to the proprietors and kirk-sessions in rural parishes. Under this authority what destitution exceeded the liberality of cotters to each other fell under the oversight of the kirk. The custom arose of taking a collection at the church-door at the Sunday morning service, and in cities of turning it in to the town hospital, whence out-and in-door relief was distributed among the poor from all the parishes. According to Dr. Chalmers, compulsory assessment did not exist in more than eight Scotch parishes prior to 1740. But in the southern counties, and especially in their cities, the influence of England led to the increase of assessments, so that in 1820 it existed in 192 out of 885 parishes, and in 1839 in more than one-fourth, comprising half the population of Scotland. The disruption of the Kirk impaired the competency of the sessions to administer the poor-funds, and the influx of Irish emigrants, with the depression following Earl Grey's administration, carried pauperism to an appalling height, one-sixth of the population of Glasgow being at one time on the relief-list. In 1845, to promote similarity of method and adequate assistance, Parliament made the Scotch law conform to the English in respect to a general board of commissioners and the work-house test of destitution. As an illustration of the effect of the new system there may be instanced a proprietor who prior to 1845 gave £5 a year to the church-door collection, and was thought liberal, but in 1869 paid in rates £407 17*s.*, and his tenants an equal amount. Our authority adds, "That whereas a more happy, contented set of paupers could hardly be found before 1845, a more discontented set than they are in 1869 and 1870 can hardly be found, notwithstanding a constant system of begging for additional help from the charitable."

While the poor-rates have diminished the kindnesses of the poor to each other, the rich have grown more lavish as their enormous concentration of wealth has removed them from contact with their lowlier neighbors. The charitable foundations of Great Britain also have increased rapidly in value, until their expenditure in London is estimated to exceed that of the parish unions. Of this great mass of private charity there is no authentic computation. Many parochial, municipal, and trust corporations make no accounting to the public. The London City companies are believed to control an annual income from trust funds of over $500,000. Edward Denison wrote not long before his death in 1870, "Certain calculations put the London charities at a total of £7,000,000—enough to give £17 a head to 400,000 souls"—an estimate which reckons every seventh person in that city a recipient of alms, and allows $400 to an average-sized family, or more than an unskilled laborer can earn in England. Private charities, when done without personal acquaintance with the poor or executed by the official almoners of some board of directors, have the same effect as public relief. Their evil influence has been accelerated by the changes in the distribution of population arising from industrial reorganization. Great cities have grown up where the poor are pressed into obscure streets and uncleanly outskirts. Thither labor migrates for employment, leaving the restraints and ties of home; thither the predatory come to take advantage of the opportunities afforded by unorganized charity and by the obscurity which a man can have in a crowd. For these provision is made in the casual wards of the work-house or police-station, in night-refuges, in soup and clothing societies, and in the thoughtless alms of the street or the back-door. Acting without concert, the uncounted and irresponsible private agencies of relief strip away the dread of being penniless in a great city and facilitate the practices of the impostor. In all the systems now passed in review the same features are apparent: pauperism grows with the provision made for its relief; public, corporate, or indiscriminate personal relief deranges the natural laws of economy, weakens the ties of kindred, dries up the fountains of personal kindness, facilitates living among strangers, attracts the depraved and dissolute, extinguishes gratitude under its indifference or mechanical administration, impairs the motives to thrift and frugality, envelops and discourages beneficence with its fruitlessness, or, worse, with its imposture, invades the self-respect of the pauper, degrades the condition of the laborer. They have opened a wide avenue from honorable independence to the inveterate and unsocial vices of self-abandonment, intemperance, squalor, deception, and licentiousness.

Such is the problem charity organizations had to encounter. Fortunately, there was experience to guide its promoters. Dr. Chalmers's administration of St. John's Church, though it was but temporary, remained as more than a reminiscence; it was a demonstration. In 1819 the parish of St. John's, recently organized on the outskirts of Glasgow, was offered by the magistrates to Dr. Chalmers, then settled in the Tron parish of the same city. He says: "The great inducement to the acceptance of that parish was my hope to obtain a separate and independent management of the poor." He stipulated with the magistrates for the withdrawal of St. John's from connection with the town hospital, which was the general agent of the city for relief. The parish was to retain its church-door collection, amounting to £400 a year, and, on the other hand, was to care for all new applicants for aid arising in its limits. Eventually, it offered to take off the hospital lists the paupers previously sent thither from its territory. The parish comprised a population of about 10,000, and was the largest and poorest of any in the city. Dr. Chalmers's writings show that he regarded the Scotch poor-laws as not essentially different from

ish, but that the habit and practice of the two
had been in great contrast until the close of
century; that the poor-house and compulsory
had made but slow progress in Scotland, notwith-
ng law and royal proclamations; that when there
assessment or available relief-fund the poor pre-
their habits of economy and frugality, were
of halfpence to the church-collections, main-
an affectionate family solicitude one for another,
d the distress among themselves with a bounty
, while made up of small benefactions, was
r in the aggregate than the administrators of
lief-fund could allow, awakened the interest and
d the intercourse of their wealthier and more
ntial neighbors, were soothed and animated by a
l friendliness permeating the community which
d a pure and noble social unity and morality.
relief he regarded as an extravagant and cor-
system which reversed these conditions. It
d by its apparent magnificence expectations
oor which it could not gratify; it created in
a of right to aid in distress, and thus re-
t thrift and self-reliance: it extinguished
for compulsory relief was destitute of that
personal interest which reaches the heart;
the rich from the poor, offering its own
to satisfy the conscience of the benevolent;
known the generosity of the individual in all
s of society; it hindered the circulation of those
nces which flow from example, personal sympathy,
el, and reciprocal esteem. Dissolving so many
ties, it opened "advantageous scope and license
dexterity" of a people whom it rapidly rendered
al by sapping their moral and social resources.
halmers wished to return to the earlier practice
Kirk, and by preventing the rise of new cases
uperism to extinguish the whole evil through the
tion of death upon the old list of dependants.
de was to create a large body of deacons, one
300 to 500 of the population. They volun-
from other parishes, as St. John's was too
ician," to use Dr. Chalmers's term, to furnish
h men qualified by education, experience, and
n. These deacons were to attend to every appli-
eferred to them or arising in their district; they
act with tact, friendliness, and judgment, noting
ir umstances of the applicant, the causes of his
the available means of putting him beyond
on public charity. The means placed at
of the deacons were the proceeds of a
h-door collection taken at the evening service,
the doctor conducted for his poor parishioners,
rning congregation being largely composed of
tors and wealthy people from other districts of
ty. This fund amounted annually to about £80;
rning collection was devoted to parochial schools.
ng the four years of Dr. Chalmers's charge, so
m driving the poor from the parish, they came
ble numbers, and but twenty new cases of pauper-
ere found, of which five were the result of crime,
illegitimacy or desertion of the family. The
g penny-collection proved more than adequate.
estimony before a committee of the House of
ons was that the poor of his parish were in no
economic condition than those of any other par-
Glasgow, and that he attributed their comfort to
four causes: "A certain stimulus to their in-
and economy when loosened from their depend-
n a large compulsory fund; an increased aid and
support from relations to each other; an increased kindness among the contiguous families of that neighborhood; and, lastly, a stimulated benevolence on the part of the wealthy to the poorer classes." These conclusions are sustained by a number of instances related in the testimony. Dr. Chalmers's scheme continued in operation at St. John's under successive ministers until the agitation of the Kirk attending its disruption put an end to it. It was imitated in a few other parishes.

Attention has been widely attracted to the methods adopted in Elberfeld, and copied in Barmen and Crefeld. In 1823 the Prussian Government authorized each commune in the Düsseldorf circle to take charge of its own poor-relief, but until 1850 the old system, founded upon that of the French empire, remained in vogue. Then Elberfeld employed its liberty to set on foot its own plan. The town was divided into sixty visiting districts, but the Lutherans, the wealthiest community of the city, were permitted to take charge of their own paupers. The visitors were too few, their duties were neglected, expenditure increased, and the prospect was alarming. Every twelfth person was a pauper, and the cost of the relief in 1852 was £8932, while in the Lutheran community it was 30 per cent. higher than in the rest of the city. At the instigation of Daniel von der Heydt, a banker of Elberfeld and a brother of the Prussian minister of finance, the existing scheme was authorized. It comprises an ordinance and an instruction. The ordinance provides for a central board consisting of a president, four councillors, and four citizens, all chosen by the town council. The official term is three years, and rotates in such a manner as always to preserve an experienced majority. Under this board are eighteen overseers, each with fourteen visitors, all of whom are unpaid. They are recommended for appointment to the town council by the citizens of the several districts, and are bound by law to serve. The visitors of each district meet fortnightly under the presidency of the overseer, and submit a report of each application for and each disbursement of relief. Each case is decided in accordance with minute rules by a majority vote, subject to appeal by the overseer. The records of these meetings are all transmitted to the Verwaltung, or general administrative body above described. It meets on alternate weeks to the district committees, and the overseers are present, with the committees in charge of the poor house, the orphanage, and the hospital. The duties of the Verwaltung are "to investigate the condition of the poor and the special causes of pauperism, as well as the means not only of relieving but of preventing it," to hear reports of the overseers and appeals from the district meetings, to receive estimates and make appropriations for each district. The overseer must hand over the appropriations to the several visitors. Funds are raised by special and general taxation imposed by the town council. Visitors are well-conditioned and respected citizens, who are to act as friends and advisers to the poor, and to this end are limited to the charge of not more than four cases of relief at a time.

The instruction is very elaborate. It excludes from relief persons who have relatives bound in law to assist them, and this obligation extends to connections by marriage. It excludes those in receipt of private charity, but in practice private may be supplemented by town aid up to a fixed standard. Those hiring domestic servants must maintain them four weeks after they become destitute from sickness. An applicant

must pass through an examination even more scrutinizing than the Leipsic Fragebogen, and this is the only test of destitution. In accepting aid he passes under the surveillance of the visitor, who visits him frequently, notes changes in his circumstances, urges him to find work, and in case of failure to do so assigns him employment. If the pauper refuse his allotted task, waste the relief granted him, or is idle, drunken, or dissolute, his maintenance may be reduced, and until recently he was liable to imprisonment. The relief granted is medical attendance at home or in hospital, a support graduated to a scale of bare sustenance, and schooling. The income of the able-bodied who cannot procure employment may be brought up to this scale by the poor-relief. The poor-house is really a refuge for the aged and infirm, and these go out to work as their strength will permit, and may claim such part of their earnings as exceeds the cost of their maintenance. The result of this system has been that while from 1852 to 1869 population increased from 50,000 to 71,000, the number of paupers declined from 8 to 1·5 per cent., or from 4000 to 1062, and the expenditures from £8932 to £3860. At the same time there was a steady increase in the membership of provident clubs. In 1870 there were reported 822 new cases to the fortnightly meetings, but these were discharged at the rate of 60 each month.

The German plans now adduced agree in these points: in each city the whole field is occupied and virtually controlled by one organization; voluntary effort is joined with official; each society aims not at expending its resources, but at making a resort to them the last resource of the poor; it individualizes each case and adjusts the treatment to its circumstances; it employs a large number of friendly visitors to be the counsellors of the unfortunate, and by their means to make the experience and character of the respected available for the depressed; it enforces education; it stimulates the sense of family responsibility; it compels the pauper to work; it insists that the acceptance of relief carries with it the obligation of complete confidence and of compliance with the judgment of its grantors; it avowedly seeks to understand and remove the causes of pauperism, not by general social reformation, but specifically and individually. In each city success depends largely upon enlisting the services of competent, faithful visitors, and upon the frequency and thoroughness of their conferences and harmony of action.

The causes which led to the formation of the London Charity Organization Society were many and intricate. Its promoters had all the foregoing experience of failure and of success before them. They had seen the Society of St. Vincent de Paul spread itself over nearly all Europe and America, carrying with it the spirit of its founders, who were advised by M. Bailly, the editor of the *Tribune catholique* in Paris, to place "their education, their intelligence, their special knowledge of law or science, and their general knowledge of life, at the disposal of the poor; that, instead of only taking them some little material relief, they should strive to win their confidence, learn all about their affairs, and then see how they could best help them to help themselves." Its conferences were in every Catholic parish of England.

District-visiting societies had been formed in London as early as 1828 and 1844 to prompt local effort to administer counsel and aid in the homes of the poor—to connect isolated parochial beneficence in concert of action. Older still were societies for repressing mendicity, which distributed investigation-tickets to be given in place of alms to beggars. Immediately before them lay the work of Octavia Hill and Edward Denison, which was peculiarly conspicuous as successfully carried on in the poorest and most abject parts of London at a time when they were visited by severe and protracted distress. Others had preceded Miss Hill in the improvement of tenements for the poor, but she aimed at the reformation of the degraded and their apartments together. Acting as the almoner of John Ruskin, she went into unsightly courts in the east end of London, beginning in 1864, and purchased dilapidated and filthy tenements, which she placed in sanitary condition. She enforced strict regulations of cleanliness upon her tenants, and punctually collected her rents in full with her own hand. The influence of her courage, patience, firmness, and justness availed to induce some of the most squalid families of London to exchange their filthy and dissolute habits for a course of life suited to their improved tenements. Alms were not given; probably they would have marred her moral miracle.

During "the East-End Distress," as it was called, young Edward Denison volunteered to act as the almoner for the Society for the Relief of Distress. He was the son of the bishop of Salisbury and nephew of the Speaker of the House of Commons, was a graduate of Eton and Christ Church, Oxford, and was at this time but twenty-seven years of age. Disappointed with the results of doling out alms, he resolved to locate among the poor and by personal daily contact with them discover the secrets of their wretchedness. In 1868 he removed to Philpot Street, Stepney, and resided there, teaching and visiting, for eight months. Thence he wrote: "I am beginning seriously to believe that all bodily aid to the poor is a mistake; whereas by giving alms you keep them permanently crooked. Build school-houses, pay teachers, give prizes, frame workmen's clubs, help them to help themselves, lend them your brains, but give them no money, except what you sink in such undertakings." Denison and his associates had entered upon schemes to unite the charities of London in some system of co-operation, and they were the pioneers of the London Society for Organizing Charity, and participants in its earliest action. In 1869, Lord Lichfield, Sir Charles Trevelyan, and others, who had joined for some less defined enterprise, resolved to call their association The London Society for Organizing Charity and Repressing Mendicity. Their purpose was much advanced by a minute of the poor-law commissioners passed Nov. 20th, recognizing private charity as an element to be reckoned in the distribution of public relief. The promoters of the new plan aimed at no less than bringing all the charitable relief of London, whether legal, corporate, or individual, into correspondence and concert of administration. They offered their own organization as a device by which this could be achieved without violation of charters, surrender of independence, or wounded *amour propre*. The society is under the presidency of the bishop of London; the chairman of its council is Prince Leopold. The council consists of the chairman, vice-chairmen, and treasurers; of annually-elected representatives from each district committee, with its chairman and secretaries not exceeding two; of additional members in the proportion of to four district representatives; and of r of London charitable institutions. through an executive committee.

district committees, one for each metropolitan [illegible]-law union. As far as possible, these consist of [illegible] of religion, guardians of the poor, and repre[illegible]ves of the principal local charities. The society [illegible]ori[illegible] the district committees and donors of one [illegible]ru[illegible] or more to the funds of the council, and it [illegible] annually or by special call. District committees [illegible]w deal with all cases of alleged want referred to [illegible] The council supervises and assists the district [illegible]ittees, considers questions of principle and gen[illegible]methods, seeks the systematic co-operation of [illegible]on's larger institutions, and to improve the ad[illegible] ation of charity, to suppress imposture; and it [illegible]o onds with similar societies elsewhere. The ob[illegible]s of the society are—co-operation of all charitable [illegible]n order to check the evils of "overlapping" [illegible]by independent action; to investigate all applications for relief, however made; to obtain from proper charities or from individuals suitable and adequate aid for deserving cases; to assist, in the absence of other resources, and by loans if possible, cases in which temporary help may tend to permanent benefit; to repress mendicancy by gratuitous distribution of investigation-tickets; to place its investigations at the service of charitable agencies and private persons having a proper claim thereto; to inform the public regarding existing charities; to become a centre of reference and information; to promote social and sanitary reforms and habits of providence and self-reliance. Its main principles of work are thorough investigation before relief, and procuring assistance adequate to render the applicant independent of future aid. It does not desire to be a relieving agency, but to direct the benevolent forces of the community into efficacious channels. Relief is determined by the district committee after investigation, and is not restricted in character; whatever is requisite is attempted, and all appliances and agencies available are utilized. Investigation becomes a discriminative test between imposture and destitution; it often discloses legitimate resources which render the applicant independent of all charity at once, such as the sympathy of kindred, the means of retrieving a false step, a better domestic economy, a pension due, a chance of employment.

The results of the society's work are to be sought in the abatement of the poor-rate, in the reduced expenditure of other charitable institutions, in diminished number of mendicants, and in the arrest of many a progress toward pauperism and vice. It is estimated that the expenditure of London on the care of its poor has been reduced about 30 per cent. since 1869, and it is stated that one can obtain information concerning almost every applicant for aid who may accost him on the streets or at his door in that city within twenty-four hours. The society has about ninety subordinate or affiliated organizations in the three kingdoms. From 1869 to 1881 the number of paupers in England and Wales receded from 1,079,391, of which one-fifth were able-bodied, to 803,126, of which one-seventh were able-bodied. Criminal convictions sank from 14,340 to 11,214 in 1880, and the attendance on inspected schools nearly trebled, while the inspections only doubled. In six poor-unions of London pauperism decreased from 1869 to 1879 from 26,289 to 14,181. The coincidence of these facts with the history of charity organization is at least significant of the remedial influence of the new attack on pauperism.

Similar movements have appeared in the United States, avowedly founded upon the English plan. They were preceded by pioneer enterprises, some of which failed from vagueness of aim or inadequate method, and some merged into the organization societies. In 1869 the Hebrews of Philadelphia merged their five leading relief societies into one administration, to secure for their own community the same ends as are sought by charity organizationists. In 1873 the Germantown Relief Society was started in a suburban ward of Philadelphia. It had a board of seven managers and an auxiliary corps of women visitors. The old borough was districted so as to give but few poor to each visitor; every case was carefully searched out, and the administration was judicial, sympathetic, and firm. Within a few years the society gained such a hold upon the community that the poor-guardians of Germantown and its dispensary came into hearty co-operation. This organization is now one of the local branches of the Philadelphia Society for Organizing Charity, which was established in 1878. Since then the city councils have cut off their appropriations for out-door relief, which amounted to $50,000 in 1878, on the ground of the existence of this society. It comprises ward or local branches covering the greater portion of the city, and a central board exercising an advisory supervision over the former.

In Buffalo an organization was made in December, 1877, and the society was very successful from the start in securing the co-operation of the civic authorities and of the leading charitable societies of all denominations. Before its influence the out-relief of the poor-master shrank away by many thousands of dollars. It adheres strictly, except in a very few emergency cases, to the refusal of any relief whatever, but applies itself to investigation, to stimulating provident schemes, and to visitation. In Brooklyn, out-door relief from public funds was abolished in 1878, and in the same year the Bureau of Charities was founded, although it did not begin active operations until three years later. In New York, where the need was greatest, but the task extremely difficult, a charity organization society was not formed until Jan. 25, 1882. It has, however, been efficiently managed, and is one of the best in the country.

In Boston a similar movement takes the name of "Associated Charities." Its initial work was much facilitated by the existence of the Charity Building on Chardon Street, an edifice erected partly by private and partly by civic munificence in order to concentrate under its roof the offices of the municipal and general charities of the city. A certain amount of co-operation was already established, and "The Associated Charities" was able to perfect a very thorough system of registration for the use of the benevolent agencies of the city. The society has created district auxiliaries called "conferences," which are composed of representatives of parishes, of local charities, and of volunteer visitors. No relief is given by the society, as its object and the endeavor of the visitors are to lift each case of distress above dependence on alms.

In all the charity-organization societies there is agreement in aim. They avoid all proselyting on the one hand, and on the other encourage each religious community to provide physical, social, and moral relief for its own members.

Some of the recent measures adopted for removing the causes of pauperism are here epitomized. In 1886 Buffalo adopted a system of central registration to aid the co-operation of the various benevolent societies. This has proved very useful in the prevention of fraud,

and is spreading to other cities. In 1887 Boston passed a law prohibiting peddling or begging by children, and in the same year Pennsylvania enacted a measure to provide a system of wayfarers' lodges, which is now in operation. Various other legal devices have been adopted, and numerous private measures instituted to prevent mendicancy. Among these are labor-bureaus or work exchanges, wayfarers' lodges or "friendly inns," sewing homes and laundries, legal protection societies, dime-saving associations, coal-saving societies, measures for placing the children of worthless parents under proper guardianship, and various other charitable devices. The Sunday Breakfast Association of Philadelphia has succeeded in reforming a large number of confirmed vagrants and drunkards. The subject of charity organization has even been made a branch of school study in the Buffalo high-school, while lectures on the subject are given in the Johns Hopkins University, and some attention paid to it in other universities.

There are said to be now about 250 charity organization societies in the world, with co-operative branches in many minor cities; 62.5 per cent. of the pauperism within the limits of the 34 larger societies of the United States has been investigated and registered, while of the various associations for out-door and in-door relief more than half are now working in co-operation with these societies.

The result of these various measures has been an encouraging reduction of pauperism, it being reduced in Elberfeld, Germany, 78 per cent. in 15 years; in London, 30 per cent. in 10 years; in Buffalo, 37 per cent. in 10 years; and in Cincinnati, 16 per cent. in 1 year. In New York State, in 5 years, 4548 chronically dependent families were made self-supporting. It is estimated that some 50 per cent. of applicants need employment, not relief; about 20 per cent. need discipline; and that not more than one-third of the whole number stand truly in need.

CHARITY, Sisters of, in the U. S. Among the numerous religious societies of the Catholic Church there are several whose general designation is that of "Sisters of Charity." These are all branches of the same parent stock, La Compagnie des Filles de la Charité, established in France in the year 1633 by St. Vincent de Paul, with the aid of a widow lady named Legras. There are several orders of the Sisters of Charity in the United States:

I. Emmittsburg Sisters.—The founder of the Sisters of Charity in the United States was an American widow lady, Mrs. Elizabeth Seton, a native of the city of New York and a convert of the Catholic Church. Having removed to Baltimore in 1808, she was encouraged to begin a society for the education of girls and for other pious objects. On June 1, 1809, Mrs. Seton and four companions, with the approval of Archbishop Carroll, formed themselves into a religious community. Mother Seton, as Mrs. Seton was now called, bound herself by vow to poverty, chastity, and obedience, and with her associates assumed a uniform habit, which consisted in a plain black dress with a short cape, a white muslin cap with a crimped border, and a black crape band around the head fastened under the chin. In July, 1809, Mrs. Seton and her companions, who now numbered ten, established themselves near Emmittsburg, in Frederick co., Md., on a small property which they called "St. Joseph's." As it had been intended from the beginning to affiliate the new institute to the Daughters of Charity in France, measures were taken to procure the rules and constitutions of their society, and to invite some of them to come to America and aid in establishing a branch of the order in this country. Bishop Flaget of Bardstown, Ky., succeeded in obtaining the assent of the society at Paris to the proposed measure, and several sisters were appointed to proceed to the United States, but their departure was forbidden by the French Government. A copy of their rules, however, was obtained in August, 1810, and the new community took the name of Sisters of Charity of St. Joseph. In 1812 there were twenty sisters. After many privations the community became quite flourishing, and before Mother Seton's death, which took place Jan. 4, 1821, sisters had been sent to Philadelphia and New York. St. Joseph's continued to be the mother-house, and comprised the novitiate and a boarding-school or academy for young ladies, and the services of the sisters were extended to many parts of the country. On March 25, 1850, the long-delayed union of the Emmittsburg sisters with the sisters of France was completed. The habit hitherto worn was then exchanged for the bluish-gray woollen dress and white *cornette* of the French sisters. In 1878 the Emmittsburg community numbered 1179 sisters, who directed 106 establishments such as schools (for girls only), hospitals, and asylums, in different parts of the United States.

II. New York Sisters.—The New York Sisters of Charity adhere to the costume and rules of Mother Seton, and represent the original society as it existed up to the union with the French sisters. Bishop Connolly of New York obtained some sisters from Emmittsburg in 1817, and on Sept. 13 they took charge of St. Patrick's orphan asylum in that city. In 1846 there were fifty sisters in the diocese of New York, and Archbishop Hughes determined to organize a community distinct from and independent of that of Emmittsburg. Thirty-one sisters remained in the old congregation, and on Sept. 8, 1846, formed a community under the title of "Sisters of Charity of St. Vincent de Paul." Pope Pius IX. approved the new order, and conferred upon its members all the rights and privileges granted to the Sisters of Charity in France. The growth of the new community was rapid, although its members are now only found in New England and the Middle States. They number (1883) 786 members, who conduct 98 establishments of charity and education. The mother-house, to which are attached the novitiate and an academy for young ladies, is at Mount St. Vincent on the Hudson.

III. Madison Sisters.—The Sisters of Charity in New Jersey, with the exception of those attached to St. Mary's Church in Jersey City, are an independent community, although an offshoot from the New York sisters. They were established by Bishop Bayley on Sept. 30, 1857. Their habit differs only in a slight degree from that of the New York community, but their rule is the same. The mother-house is near Madison, in Morris county, to which are attached the novitiate and an academy for young ladies. The number of sisters of this branch of the order is 375, who conduct 3 orphan asylums. 48 select or parochial schools, and 1 protectory, all in the dioceses of Newark and Trenton, N. J. (1883).

IV. Nazareth Sisters.—These Sisters of Charity were founded by Bishop David in Kentucky. They form an independent community, distinct from any other. In November, 1812, two pious ladies of mature age, Sister Theresa Carico and Miss Elizabeth Wells

began their work of charity in a small log house. On Jan. 21, 1813, another member, Sister Catharine Spalding, joined the young community, and on the same day their founder and superior presented to them the provisional rules which he had drawn up, unfolding the nature, object, and duties of the new society. In June of the same year the community was increased to six members, and two years later the society adopted the rules of the French sisters. The habit of the sisters is a bluish woollen dress and a white cap without the cornettes. The mother-house is at Nazareth, near Bardstown, Ky., which contains the novitiate and an academy for young ladies. There are 338 members in the society, which conducts 1 hospital, 1 infirmary, 1 orphan asylum, and about 26 schools and academies in Kentucky, besides other establishments in Mississippi and Ohio (1883).

V. PROVIDENCE SISTERS.—The "Sisters of Charity of the House of Providence" were established in Canada. The mother-house is at Montreal. It was founded in the year 1844 by Bishop Bourget. The first superior was Madame Garrelin, who procured a copy of the rules of St. Vincent de Paul, which have been since followed by the community. In 1854 a colony of these sisters was established in Burlington, Vt., at the invitation of Bishop de Goesbriand. There are 10 sisters there, who direct the Providence orphan asylum and hospital; and several houses of the order have been founded in the West and on the Pacific coast—viz., 3 in Oregon, 7 in Washington, 4 in Montana, and 2 in Idaho Territories (1882). The habit of the sisters is a dress and cape of coarse black serge, and a coif of same color and material trimmed with white linen.

The *Sisters of Charity of Montreal*, commonly called Gray Nuns from the color of their habit, do not follow the rule of St. Vincent de Paul, but embrace works of charity in hospitals, asylums, and poor schools. They were introduced into the United States by Archbishop Williams of Boston in 1866. (R. S.)

CHARLEMONT, JAMES CAULFIELD, first EARL OF (1728–1799), an Irish politician, born at Dublin, Aug. 18, 1720, the son of the viscount Charlemont. In early life he travelled extensively on the Continent and in the Levant, making careful studies of the antiquities and the costumes of various countries. Returning he took his seat in the Irish House of Peers, and in 1763 was made an earl in consequence of his activity in putting down a rebellion. He was an early patron and friend of Burke, Flood, and Grattan, and in 1775 sent Grattan to Parliament for the borough of Charlemont. In England he was the friend and associate of Johnson, Goldsmith, Reynolds, and Hogarth. During the American Revolutionary war Charlemont commanded the volunteer army for the defence of Ireland. His *Original Letters* (1820) are of much historical interest. He wrote some valuable papers for the Royal Irish Academy, of which he was president, and left a *History of Italian Poetry* (never printed). He died Aug. 4, 1799. Lord Charlemont was a man of amiable character, varied accomplishments, and agreeable manners, and was a liberal patron of art and letters. His conservatism or timidity in conceding the disbandment of the volunteer army is regarded as one of the steps which led to the rebellion of 1798, and the resulting union with Great Britain.

CHARLES XV. (LOUIS EUGENE) (1826–1872), king of Sweden and Norway, was born May 3, 1826. He was grandson of Marshal Bernadotte, who was made king of Sweden in 1818, and succeeded his father, Oscar I., July 8, 1859. He was crowned at Stockholm, May 3, 1860, and at Trondhejm, Norway, Aug. 5, 1860. He was greatly beloved by his people, and during his reign many reforms were made both in parliamentary affairs and in the general administration. He was highly accomplished, and was noted for his literary and artistic tastes. He died at Malmö, Sept. 18, 1872, deeply regretted by the whole nation. His fine collection of works of art in the castle of Ulriksdal, including paintings illustrative of Scandinavian history, was bequeathed to the state, as was also his collection of arms, which has been placed in the National Museum at Stockholm.—His only child, PRINCESS LOUISE JOSEPHINE EUGÉNIE, born Oct. 31, 1851, was married to Christian Frederic, prince-royal of Denmark, July 28, 1869.

CHARLES, ELIZABETH RUNDLE, an English writer, was born about 1826. She was married to Mr. Andrew P. Charles of London. She has written a number of popular stories illustrating important periods in the church history and religious life of modern times. The first of these (*Chronicles of the Schönberg-Cotta Family*, 1863) gave a vivid sketch of the life of Luther; the *Diary of Mrs. Kitty Trevelyan* (1864) illustrates the rise of Methodism in England; *The Early Dawn* (1864) relates the conversion of Britain to Christianity; *The Draytons and the Davenants* (1866) is a story of the Parliamentary war; and a sequel to this, called *On both Sides of the Sea* (1867), relates partly to the settlement of New England. Besides these historical stories, she has published various religious books, among which are *Mary the Handmaid of the Lord* (1865), *The Song without Words* (1865), *Women of the Gospels* (1866). Her religious novels include *Winifred Bertram* (1865), *Against the Stream* (1873), *The Bertram Family* (1875), *Conquering and to Conquer* (1875). One of her most valuable books is *The Voice of Christian Life in Song*.

CHARLES CITY, the county-seat of Floyd co., Iowa, is on Cedar River and at the intersection of the Iowa division of the Chicago, Milwaukee, and St. Paul Railroad with the Cedar Falls and Minnesota branch of the Illinois Central Railroad, 90 miles W. of the Mississippi River. It has a national bank, a savings bank, three weekly newspapers, eight churches, and a high school and other good schools. It has good water-power, and steam is also used in its manufactories. It has foundries, machine-shops, planing-mills, plough-factory, tow-mill, creamery, and other industries. It was settled in 1853, and incorporated in 1870. The inhabitants are chiefly from the Eastern States. No liquor is allowed to be sold in the town. Population, 2789.

CHARLESTON, the county-seat of Coles co., Ill., at the intersection of the Indianapolis and St. Louis Railroad and the Toledo, Charleston, and St. Louis (narrow-gauge) Railroad, 144 miles E. of St. Louis. It has a court-house, two national banks, three hotels, seven churches, a fine high school with elegant building and several other schools, a public library, two weekly newspapers, a fair-ground, a stock importing and breeding association, a pork-packing establishment, foundry and stove-factory, broom-factory, woollen-factory, carriage-factory, two flour-mills, and other industries. It has fine water-works, which supply water from the Embarras River, 2½ miles distant. It was laid out in 1831, and incorporated as a city in 1865. Population, 4135.

CHARLESTON, a city and seaport of the United

States, the largest town and the commercial emporium of South Carolina, and the county-seat of Charleston county. It stands upon the point of a cape or peninsula having the Cooper River on the E. and the Ashley on the S. W., these two rivers, with the Wando, farther E., having the harbor of Charleston for their common estuary. Lat. of the city, 32° 45′ N., lon., 70° 57′ W. It is 453 miles direct (610 by rail) S. S. W. of Washington, D. C., 130 miles by rail S. S. E. of Columbia, the State capital, and 115 miles by rail N. E. of Savannah, Ga. Its beautiful harbor is one of the most commodious and accessible on the Atlantic coast, the approaches being safe and easy; and the bar (which had a depth of 16 feet at low tide and 22 at average high tide) has been improved by the erection of stone jetties from Sullivan's and Morris Island, so as to increase the depth of the channel to 26 feet. Besides the main or ship channel there are three swash channels or entrances suitable for vessels of light draft only. The harbor-mouth, or seaward entrance of the port, is 7 miles S. E. of the town, and the estuary covers some 15 square miles. The entrance lies between Sullivan's Island on the N. and Cummings' Point (the N. extremity of Morris Island) on the S. The approaches are well buoyed and lighted, and the inner waters are deep and well sheltered. The fortifications are Fort Moultrie, on Sullivan's Island; Castle Pinckney, on an islet called Shute's Folly, in the mouth of Cooper River; Fort Sumter, the principal defence, on a shoal just within the entrance and to the left of the main channel; Fort Ripley, near Castle Pinckney; and an abandoned work called Fort Johnson, on James Island and on the S. side of the harbor. The town is regularly laid out, and in general is well built. Of its 70 miles of streets, more than 9 miles are paved with cobble-stones, and 5 are planked; other parts are macadamized, and there is a shell-road. The sidewalks in the main part of the city are paved with flagstone or brick. There are 5 miles of street railway. The sewers of the city comprise 5 miles of tidal drains, built 20 inches above mean low tide. These and other street-drains have been found defective, and are now being replaced with iron-stone pipes. Water for drinking and other purposes is obtained from cisterns supplied by rains; but excellent water has been furnished by an artesian well 1970 feet deep, which gives 250 gallons per minute, with a temperature of 99.5 F. The Battery, a massive stone wall on the S. E. front of the city, 10 feet wide and 1500 feet long, furnishes a fine promenade and is bordered by a broad drive; adjoining it are handsome private residences with beautiful gardens. The environs of the city are pleasant and abound in points of historic interest. Sullivan's Island, to the E., has many fine cottages and suburban homes. To the N. extends a picturesque and fertile plain, and the whole region is characterized by a profuse half-tropical vegetation. Among the principal buildings and public institutions of interest are the custom-house, the city hall, the academy of music, a fine and spacious theatre, the historic St. Michael's Church, the old and interesting St. Philip's Church, the city, Catholic, and colored orphanages, the arsenal (a fine building now leased in perpetuity for the use of a large orphan school for boys), the Central Presbyterian Church, the court-house, the medical college, and the College of Charleston. The churches are numerous, including 6 Catholic, 10 Episcopalian, 9 Presbyterian, 8 Methodist, 5 Baptist, and 3 Lutheran; also Unitarian, Jewish, and other places of worship. The public and private charitable institutions are numerous and well sustained. The schools, public and private, are of every grade. In 1881 the five public schools had 6 male and 85 female teachers, with 2009 white and 2005 colored pupils. The expense of these schools was $59,320. The high school is supported partly by an appropriation from city council. It has a four years' course, and an average attendance of 150 boys. There are also parochial and denominational schools and excellent private academies for the youth of both sexes. The Avery Normal Institute, under the care of the American Missionary Association, is intended to prepare colored teachers. The College of Charleston is partly endowed and partly supported by the city.

Charleston is one of the chief Southern ports, both in the foreign and coastwise trade. The chief articles shipped hence by sea are upland and sea-island cotton, rice, spirits of turpentine, rosin, timber, phosphate rock, manufactured phosphates (fertilizers), fruits, and market-garden products. The phosphate industry and the market-garden business were not carried on here to any important extent before the Civil War. Charleston's commerce is fed by the following important railways: the Charleston and Savannah, the North-Eastern, and the South Carolina. The latter, which has important interior connections, has recently extended its track to wharves on Cooper River, so that vessels may load directly into the cars. The wharves of the city furnish accommodations for 200 vessels. The foreign trade is chiefly with England, Germany, Cuba, and the British West Indies. Before the American Revolution, and even down to 1816, Charleston exceeded New York in the amount of its commerce; but it has long since lost its former eminence. The coastwise trade now far exceeds the foreign in volume and importance. Lines of coast-steamers ply hence on the "inside route" among the sea-islands of this State and Georgia, along channels entirely protected from the winds and waves of the open sea. In the fiscal year ending June 30, 1883, the imports of the Charleston district amounted to $498,891, and the exports to $22,573,167. The chief items of import are soda-nitrate, sulphur (used in the phosphate manufacture), fruits, iron and steel goods, and salt. The direct importations in American vessels are valued at $46,444; in foreign, at $452,447. The chief items of foreign export were sea-island cotton (5160 bales, or 1,754,468 pounds, worth $506,629), other cotton (367,742 bales, or 173,736,398 pounds, worth $20,126,456), fertilizers ($205,417), spirits of turpentine (2,476,830 gallons, worth $1,045,421), rosin and turpentine (234,411 barrels, worth $619,618), oil-cake (1,192,880 pounds, worth $11,740), cotton seed (688,672 pounds, worth $7475), lumber (1,291,000 feet, worth $18,572), besides shingles and shooks to the value of $26,583. Of rice the export was only 7341 pounds.

Charleston carries on an active wholesale trade with the towns of the interior. The number of firms engaged in wholesale and retail trade in 1883 was 924, and their annual sales were estimated at $28,955,000. There were 6 banks, with a total capital of $1,120,000 and a surplus of $637,000. The mechanical and manufacturing establishments numbered 273, with a capital of $6,628,470, giving employment to 5167 hands and producing goods to the value of $9,010,731. The principal manufacture is that of fertilizers, the phosphate rock so abundant in the vicinity being utilized in this industry. The product was valued at $2,552,000.

The financial receipts of the city for 1882 from all sources were $709,578, and its expenditures were $698,807. The city debt, which in 1870 stood at

$5,241,710, had been reduced to $4,229,251, of which $3,413,300 is in four-per-cent bonds, the rest being at higher rates. Rigid laws now restrain the power of increasing the indebtedness. A paid fire department was established in 1882, which consists of 100 men and has 8 steam fire engines, 2 hook and ladder trucks, and other apparatus. The fire-alarm telegraph has 30 miles of wire.

The healthfulness of the city is shown by a death-rate of 22 per 1000 among the whites; but the mortality among the colored population is 41 per 1000.

The original settlement, called Charles Town in Carolina, was made on the Cape Fear River, in what is now Brunswick co., N. C., in 1664, under Sir John Yeamans, at or near the mouth of Old-Town Creek, and Yeamans became a landgrave or governor of a colony or county called Clarendon, which then included all South Carolina. Another Charles Town in 1679 was founded by Capt. William Sayle, on the S. W. bank of the Ashley River, 3 miles above its mouth. The settlers of this place had formerly lived at Beaufort or Port Royal. The present site of Charleston was then called Oyster Point, and buildings seem to have been erected there at an early date. In 1680 the authorities sanctioned the removal of the town to its present site, and the new town became the capital of the colony, most of the settlers of the two older Charles Towns removing to it. A colonial parliament was established in 1682. Charleston's history in its colonial period is interesting and eventful, and the town took a conspicuous part in the movements which led to the War of Independence. Prominent events in its history have been the attack by Clinton and Sir Peter Parker on the fort on Sullivan's Island, 1776; Prevost's attempt upon the town, 1779; its siege and capture by the British, 1780; the evacuation by the British troops, 1782; the Nullification movement of 1832; the passage here of the Ordinance of Secession, 1860; the bombardment and capture of Fort Sumter by the Confederate forces, 1861; the subsequent Federal operations against the city; and its evacuation by the Confederates in 1865. The city suffered much during the Civil War, which indeed first broke out here, and in 1861 half the town was destroyed by fire; but since 1865 a good part of the city has been rebuilt.

The population of Charleston in 1870 was 48,956, of whom 44,064 were natives of the United States; in 1880 the population was 49,984—of native birth, 46,034; foreign-born, 3950. In 1880 there were 22,699 white residents and 27,276 colored. Of the American-born residents, 43,845 were natives of South Carolina. Of the foreign-born, 1537 were Germans; 1963 were from the British Islands, and of these 1611 were Irish. There were "engaged in professional and personal services" 10,060 persons, of whom 4632 were males and 5428 females, 9521 being native-born; "the persons engaged in all classes of occupations" were 20,324 in number, 13,280 being males, 7045 females, and 18,379 Americans by birth; "engaged in trade and transportation," 4639, of whom 4349 were males, and 3754 of American birth; "engaged in manufacturing," 5134 persons, of whom 3905 were males, and 4646 were born in the United States. The census of 1880 reports for the city 11,406 families and 6552 dwellings, or 4·38 persons to a family and 7.63 persons to a dwelling. By the census of 1890 the population had increased to 54,592.

CHARLESTON, the county-seat of Kanawha co., W. Va., and the permanent capital of the State, is on the right bank of the Great Kanawha River, 60 miles from its mouth and 130 miles S. of Wheeling. Across the Kanawha, which is here over 200 yards wide, runs the Chesapeake and Ohio Railroad, with two steam-ferries from the dépôt to the city; the Ohio Central Railroad, which follows the bank of the Kanawha, enters the city by a bridge over Elk River, a branch of the former, and about a hundred yards wide. The navigation of both rivers has been improved by permanent locks and dams erected by the U. S. Government. In the Kanawha salines, which extend about 10 miles on both sides of the river above Charleston, salt water is obtained in abundance by boring at a depth varying from 500 to 2000 feet. For many years from 1,000,000 to 3,000,000 bushels of salt were made annually. Large quantities of bituminous coal are mined in the valley, but little has been done to develop the iron-field. Charleston is the commercial emporium of the valley and carries on considerable trade. Besides the railroads there are weekly packets to Cincinnati and to Pittsburg, a daily packet to Gallipolis, and numerous local packets and tow-boats ply the rivers.

Charleston presents an uninviting appearance on the river-side; there is, however, a spirit of progress and the city is steadily improving. The streets are fairly laid out, adorned in many places with rows of trees, handsome buildings, neat lawns, and gardens. The principal streets are lighted with gas. In 1882 the city council adopted the Gates pavement, so named from Virgil A. Gates, a prominent citizen, who had laid an experimental section in 1871. The State Capitol is a fine building of stone and brick, 138 feet long, 56 wide, and 140 high; the custom-house is of brick. There are two first-class hotels, besides others of less pretensions, two State banks, an opera-house and several halls, one daily and four weekly newspapers, two monthly periodicals, three public schools, a military academy, and other good private schools. There are eleven churches and chapels, comprising three Baptist, two Methodist Episcopal, one Methodist Episcopal, South, two Presbyterian, one Episcopalian, one Roman Catholic, and one Christian Bride. The industrial works are two foundries with machine-shops, two flour-mills, two planing-mills, seven saw-mills, and a boatyard and docks; also woollen, barrel, handle, pump, hub, and cigar factories. In 1882 the tax valuation of property, real and personal, was $1,663,316.

Charleston was settled about 1786 by George Clendennin of Virginia, who built a fort of hewn logs, 40 by 30 feet and two stories in height, which remained standing till 1874. In this fort the first county court was held in 1789. The town was incorporated in 1794 by the name of Charlestown, which was afterwards changed to Charleston. Charleston was incorporated as a city of the second class in 1870. By the census of 1890 its population was 6734. In 1869 it was made the capital of the State, but in 1875 the seat of government was removed to Wheeling. In 1885 the capital was permanently located at Charleston, where a fine building was erected for State purposes.

CHARLESTOWN, the county-seat of Jefferson co., W. Va., is 65 miles from Washington City and 10 miles W. of Harper's Ferry, on the Winchester and Potomac division of the Baltimore and Ohio Railroad and the Shenandoah Valley Railroad. It has six churches, two hotels, two newspapers, excellent private schools, as well as free schools for white and colored pupils, commodious town-hall and other fine public buildings, thirty stores, foundry and machine-shops, sash, spoke-, and rim-factory, planing-mill, flour-mill.

and gas-works. The town was named after Charles Washington, a brother of Gen. George Washington, who gave the land upon which the public buildings are erected, and its streets are principally named after the Washington family. Population, about 2500.

The county was formed in 1801, but the town existed long before, and is rich in colonial and Revolutionary associations. It was a point on the march of Gen. Braddock to Fort Duquesne in 1755, and the well which his soldiers dug is still in use. In this town John Brown and five of his followers were tried and hung Dec. 2, 1859. The records of this trial and the will of John Brown are preserved in the county clerk's office. During the Civil War this region was the scene of frequent fierce conflicts, the most noted of which occurred on Oct. 18, 1863, when the Confederate general Imboden surprised and captured the Union troops holding the town, but was driven out a few hours later.

CHARLOTTE, the county-seat of Eaton co., Mich., is at the intersection of the Chicago and Grand Trunk Railroad with the Grand River Valley branch of the Michigan Central Railroad, 19 miles S. W. of Lansing. It has a national bank, two weekly newspapers, eight churches, several schools, a public library, and a fire department. It has manufactories of tables, carriages, barrels, etc., and is the trade-centre of an agricultural and lumber region. Population, about 3100.

CHARLOTTE, the county-seat of Mecklenburg co., N. C., is 11 miles N. of the South Carolina line and 162 miles W. of Raleigh, on the North Carolina Railroad. The other railroads are the Atlanta and Charlotte Air-Line, the Charlotte, Columbia, and Augusta, the Atlantic, Tennessee, and Ohio, and the Carolina Central. It has a U. S. branch mint, three hotels, three national banks, one daily and three weekly newspapers, twelve churches, three schools, and is the seat of Biddle University (Presbyterian) and a female seminary. It has two machine-shops, a cotton-mill, flour-mill, and two planing-mills. It is incorporated as a city, and has gas- and water-works. It was settled in 1756 by Scotch-Irish emigrants, and claims to be the place where the first Declaration of Independence from Great Britain was made, May 10, 1775. Its property is valued at $2,500,000; its yearly expenses are $20,000, and it is free of debt. Its present population, of various origin, numbers 11,555.

CHARLOTTESVILLE, a town of Virginia, county-seat of Albemarle county, near the Rivanna River, and on the Virginia Midland and Chesapeake and Ohio Railroads, 97 miles by rail west-north-west of Richmond. The UNIVERSITY OF VIRGINIA (which see), one of the leading institutions of learning of the country, is situated near the town. Charlottesville has a secondary school for boys, a school for ladies, several churches, a town-hall, two national banks, three weekly newspapers, several manufactories, and an active trade. Population in 1890, 5562.

CHARNOCK, STEPHEN, D. D. (1628–1680), an English divine born in London in 1628. His father was Richard Charnock, a distinguished solicitor. Stephen Charnock was at Cambridge a pupil of Sancroft in Emanuel College, where so many of the Puritan divines were trained. It was at the university that his interest in the religious life was awakened. He became a preacher of Southwark, but in 1649 was made a fellow of New College, Oxford, and in 1652 was appointed senior proctor of the university, winning great applause for faithfulness and ability. In 1653 he went to Dublin and became chaplain to Henry Cromwell. Being deprived by the Act of Uniformity of 1660, he went to London, and thenceforward till 1675 preached to various dissenting congregations, but in the latter year assumed a pastorate. He died in London, July 27, 1680. He was distinguished for learning, dignity, amiability, and wisdom. His *Treatise on the Attributes of God* has been many times reprinted, and still takes rank among the standard works of its class. His sermons form the bulk of the *Complete Works*, of which the Edinburgh edition, in five volumes (1864), is the best. His *Life* was written by Edward Parsons.

CHARTER. In the United States the laws of incorporation at first followed closely in the precedents afforded by the English common law. All grants of charters under that law proceeded, mediately or immediately, from the king. In early English constitutional history we find the necessity of royal authority for the bestowal of such privileges universally conceded, but as the theories of liberal government became more and more firmly fixed in the popular heart, the principle "qui facit per alium facit per se" was applied in this branch of the royal prerogative as in many others. During colonial times corporations were frequently created, and since the Revolution the validity of their charters has been universally recognized by the courts.

See Vol. V. p. 374 Am. ed. (p. 431 Edin. ed.).

It has been definitely settled as a point of constitutional law that a corporation, particularly if municipal, may exist in this country by *prescription* in the absence of any actual written charter. In this, too, the usage of English common law was followed, although the length of time necessary to establish the right of incorporation by prescription is, of course, much shorter in a country of such brief national existence as ours. As a general principle, it may be affirmed that in cases where a company can prove that it has always been recognized as a corporation, and by virtue of such recognition has acquired and enjoyed for many years corporate powers and franchises, the courts will favor the presumption of a charter, even though no such written instrument can be produced to substantiate its claim. The necessity for asserting incorporation by prescription is, however, comparatively rare.

After the establishment of the national Government the question of the authority of Congress to pass acts of incorporation became agitated, and many leading legal minds of the country took part in the discussion. The Federalist party, always the recognized champions of a strong central government, assumed the affirmative side in the argument, headed by the brilliant Hamilton, then Secretary of the Treasury. After the bill to incorporate a national bank had passed Congress, and was awaiting Washington's approval, he solicited Hamilton's opinion, as well as those of Randolph and Jefferson, Attorney-General and Secretary of State respectively, on the constitutionality and advisability of the measure. The views of the two last-named statesmen appeared before those of Hamilton, and were adverse to the bill. Hamilton's views, embodied in a document entitled "An Opinion on the Constitutionality of a National Bank," has been justly regarded by eminent legal minds as one of the most powerful intellectual efforts ever known in this country. The gist of his argument may be gathered from one of its opening sentences: "The clause [of the Constitution] which declares that the Constitution, and the laws of the United States made in pursuance of it, and all treaties made under their authority. ill be the *supreme law* of the land, is d e ve that its

powers as to its objects are sovereign. To erect corporations is an incident of sovereign power, and consequently belongs to the United States in relation to the objects entrusted to their management" (*Life of Hamilton*, vol. iv. p. 249). This right of incorporation, the friends of the bill claimed, was *constructively*, though not *expressly*, conferred by the clause permitting national legislation on commerce and revenue.

The views of the Federalist party were subsequently sustained by the decision of the U. S. Supreme Court in the important case of McCulloch *vs.* Maryland, 4 Wheat. 424, and as a result of the same doctrine the power of conferring charters within their respective jurisdictions is recognized as belonging to the Territorial governments, inasmuch as they are created by Federal enactment and receive their authority from that source.

In the States, by a sort of undisputed usage, the legislatures have been accustomed, from Revolutionary times to the present, by special act to exercise the right of granting such corporate privileges as are not inconsistent with State or national law. Their authority has been so clear and so frequently exercised that no attempt has ever been made to call it in question, or, on the other hand, to offer any argument in its defence. Within the last quarter of a century, however, owing to a considerable abuse of this power, the tide of popular sentiment has been steadily setting against all "special legislation" in cases where the application of a general statute can effect the desired result. Thus in Arkansas, Colorado, Dakota, Florida, Illinois, Indiana, Iowa, Kansas, Maryland, Missouri, Nebraska, Nevada, New Jersey, Ohio, Oregon, Pennsylvania, and one or two other States the legislature is, either expressly or constructively, prohibited by the constitution from conferring charters except (in a few cases) for certain municipal corporations. With these trifling exceptions the power not only of conferring, but of altering or amending, charters by special acts is taken away from the legislature and vested in the State Executive or in the courts, or concurrently—usually the last—while in a few of the States not mentioned above the right is exercised concurrently by the Executive and legislature. The advantages of this policy are obvious. It tends to secure uniformity of rule and construction; to prevent the aggregation of inordinate power in the hands of any specially favored corporations; to promptly recognize and provide for the existence of real wants and the redressing of real grievances. (See Dillon on *Munic. Corp.*, § 20.) Besides this, since the power of incorporation still exists *mediately* in the legislature as the representative of paramount authority, it is able with the greater impartiality to enact general provisions for its special exercise by the courts or the Executive.

The common-law incidents of a corporation in the United States, as expressed by its charter, are usually the following: (1) To have perpetual succession; (2) to sue and be sued by the corporate name; (3) to have a common seal, alterable at pleasure; (4) to render the interests of the stockholders transferable; (5) to exempt private property from liability for corporate debts; (6) to make contracts, acquire and transfer property, possessing the same rights and subject to the same restrictions as private individuals in these respects; (7) to enact by-laws and make regulations for the management of its affairs in accordance with law. (See Field on *Corp.*, § 18.) The charter also includes particulars similar to the following: The name of the corporation and its place of business; the general nature of the business; the amount of capital stock, if any, authorized, and the times and conditions of payment for the same; the time of commencement and termination of the corporation; by what officers its affairs are to be conducted, and when they are to be elected; and the highest amount of indebtedness it may at any time contract. No *private* corporation can be compelled to accept a charter, since it is in the nature of a contract between the corporation and the State, but a corporation accepting a charter is bound by its conditions both in law and fact, nor can such acceptance be partial or conditional without vitiating the corporate privileges. No subsequent general act of the legislature can annul or impair a charter granted under one previously in force; otherwise there would ensue a violation of the important constitutional provision that "no law passed by any State shall operate *ex post facto* or impair the obligation of contracts." Any corporation, however, may, by voluntary choice, accept the provisions of the new act or constitution and apply for an amended charter thereunder.

The simultaneous existence of two or more co-ordinate laws of incorporation in a few of the States gives rise to some curious results. Thus in Pennsylvania the general Incorporation Act of 1874, with the supplement of 1876, though expressly repealing several similar acts previously in force, left an important one, that of 1849, unrepealed. In applying for a charter in this State, therefore, it is customary to specify under what act the application is made, though without such specification the application would be held under the general law.

The distinction between public and private corporations, as affecting the nature and permanence of their charters, must be carefully noted. "Private corporations . . . are not, in contemplation of the law, public simply because it may have been supposed that their establishment would promote either directly or consequentially the public interest. The assent of the private corporation is required to make the charter operative, and when assented to the legislative act is irrevocable, and it cannot, by any subsequent act of legislation, be withdrawn without the consent of the corporation, unless the right to do so was expressly reserved at the time."

Public or municipal charters, on the other hand, are valid by simple act of incorporation, without formal acceptance by the municipality, and, not being in the nature of a contract, may, in nearly all the States, be revoked at will by the legislature. Such a revocation, however, must not affect existing private rights nor impair existing obligations formed under the charter; but as the public corporation is more directly, and sometimes involuntarily, the creation of the State, so the authority of the State to remodel, amend, or entirely abrogate its charter is exercised with much greater freedom than in the case of a private corporation.

A charter may expire and the corporation which it represents may terminate in one of three ways: (1) By limitation; (2) by a voluntary disbanding of the corporation; (3) by legislative or judicial repeal. The first two of these are so easily understood as to need only a passing notice, but the third deserves attention. As we have observed, the charter of a private corporation is in the nature of a contract between it and the State. Under its provisions vast accumulations of property are sometimes made and colossal interests

aggregated, the influence of whose ramifications is felt far beyond the scope of its immediate control. It was foreseen that if the State was absolutely powerless to place any check upon this undue exercise of privilege—conferred, too, as it might have been, through hasty or corrupt legislation—the public welfare, always paramount to that of an individual or body of individuals, might be seriously jeopardized. To avoid this, the constitutions of various States prohibit the creation of corporations unless subject to legislative control as to repeal or amendment; sometimes, also, the general law will have a clause to the same effect, and it has been held in R. R. Co. *vs.* Tharp, 5 Harr. (Del.), 454, that the presence of such a provision in the constitution renders one of similar import in any particular charter unnecessary. Such constitutional or statutory provision exists in Alabama, Arkansas, California, Iowa, Pennsylvania, New York, New Hampshire, New Jersey, and most of the larger States, coupled, however, with the restriction that no repealing enactment shall result in the injury of the incorporators, who in such case have their remedy in equity. Where the charter itself contains this clause of reservation, the rights conferred are mere privileges, subject to withdrawal or modification by the conferring authority. Corporations exceeding their powers render themselves liable to such legislative or legal action *ipso facto*, or they may be restrained, *pro tanto*, by injunction in equity. The law of charters has given rise to an immense amount of litigation, while the field it affords for legal research is very wide, involving as it does so many collateral branches of State and national jurisprudence. (See in general on this subject Angell and Ames on *Corporations;* Field on *Corporations;* Dillon on *Municipal Corporations;* Brice on *Ultra Vires;* and the article CORPORATION.) (E. F. S.)

CHARTER PARTY. The term *charta partita* is derived from the ancient habit of dividing the instrument and giving one-half to each party. Charter parties are of two kinds. The first and common form is a letting of certain space in the vessel to the charterer for the carriage of goods, which amounts to little more than a contract to carry, the owners being responsible as common carriers; the second is a demise of the vessel to the charterer, so that he becomes owner *pro hac vice*, manning, victualling, and possessing her, during which time the real owners are relieved from all personal responsibility for the torts and contracts of the master. The former are capable of further classification, according as they are to a direct port or to a port of call for orders; *e. g.*, a vessel to proceed to Sandy Hook or Delaware Breakwater or Hampton Roads for orders to load at New York, Philadelphia, or Baltimore, or to proceed to Cork, Plymouth, or Falmouth for orders to discharge at any safe port in the United Kingdom or on the Continent between certain limits, as Havre and Hamburg.

See Vol. V. p. 375 Am. ed. (p. 433 Edin. ed.).

The carrying trade between the United States and Europe is now done mostly in foreign bottoms, which come here in ballast and return with grain or oil. Merchants here are obliged to engage this tonnage in advance by chartering vessels on the other side "to arrive." The provisions in the charter concerning the capacity, rating, and forwardness of the vessel are accordingly very important, and the question frequently arises whether they are warranties or conditions precedent for the breach of which the charter may be thrown up, or whether they are mere descriptions and stipulations, the breach of which is to be compensated for in damages. This is a question of intention to be derived from a consideration of the whole instrument, but it may be said generally that no provision will be considered by the courts a condition precedent which is not expressed in language that is certain and does not require construction. An undertaking to sail on or before a given day would be held a condition precedent, while to sail "with all convenient speed" or "without delay" would not. It is often provided that if the vessel do not arrive on or before a given day, called the cancellation date, the charterer shall have the option of throwing up the charter.

The reciprocal lien between the vessel and the goods is derived from an old rule of the maritime law stated by Cleirac: "Le batel est obligé à la marchandise et la marchandise au batel." Originally, the undertakings secured by the lien were the right delivery of the cargo by the master and the payment of freight by the charterer; but it is gradually extending in the United States to cover every stipulation in the charter party. In other words, the charterer may hold the ship for the right fulfilment of all the master's covenants, and the master may hold the cargo for the charterer's. But no lien exists in favor of either unless the cargo has actually been loaded. (H. G. W.)

CHASE, PHILANDER (1775–1852), an American bishop of the Episcopal Church, was born at Cornish, N. H., Dec. 14, 1775. He graduated at Dartmouth College in 1796, and, having about this time become an Episcopalian, began to study theology. He was ordained deacon May 10, 1798, and priest Nov. 10, 1799. After spending some years in missionary labors in Western New York, he went to New Orleans in 1805 and organized an Episcopal church there. In 1811 he became rector of Christ church, Hartford, Conn., but in 1817 he removed to Ohio and again engaged in missionary labors. He was consecrated bishop of Ohio Feb. 11, 1819, and devoted his energies to building up the Church in the North-west. In 1823 he went to England, where he obtained large contributions, with which on his return he founded Kenyon College and Gambier Theological Seminary. A few years later he became involved in disputes with his clergy with regard to the application of the contributions, and relinquished his jurisdiction in September, 1831. For this he was censured in the General Convention of the following year. He continued his missionary work in the West, and March 8, 1835, he was made bishop of Illinois. On a second visit to England he collected funds for educational purposes, and on his return, in 1838, founded Jubilee College, at Robin's Nest, Ill. Here he resided until his death, Sept. 20, 1852. He was large and stout, and, though not highly learned, possessed great natural ability. His perseverance and energy, as well as his shrewdness and knowledge of human nature, enabled him to do a great work in establishing the Episcopal Church in the Mississippi Valley. He published *A Plea for the West* (1826), *The Star in the West; or, Kenyon College* (1828), and *Defence of Kenyon College* (1831). In 1848 he issued also two volumes of *Reminiscences.*

CHASE, PLINY EARLE, professor of philosophy in Haverford College and secretary of the American Philosophical Society, was born in Worcester, Mass., Aug. 18, 1820. He graduated at Harvard University in 1839, A. M. Harvard, 1844, LL.D. Haverford, 1876. After publishing a series of *Arithmetical Works, Sanscrit and English Analogues, Intellectual Symbolism,* and various philological papers, he began in 1863 a series

of investigations upon the laws and influences of elasticity, with especial reference to photo-dynamics. Starting from the hypothesis that all physical phenomena are due to an omnipresent power, acting in ways which may be represented by harmonic undulations in an elastic medium, he found that barometric fluctuations, electric and tidal currents, the distribution of atmospheric and ocean temperatures, the polarizing influences of thermal convection and radiation, terrestrial magnetism, solar rotation, planetary revolution, cosmical and molecular aggregation and dissociation, planetary and stellar masses and positions, spectral lines, chemical affinity, nebular subsidence, and the mechanical equivalent of heat, all give evidence of rhythmic oscillations which are propagated with the velocity of light. Some of the results of his meteorological researches were embodied in the system of weather-forecasts which was adopted by the United States Signal Service Bureau, and he made predictions of nodal planetary influence which were subsequently verified by the observations of European and American astronomers. He demonstrated the mechanical control of electrical currents twelve years before the telephone was invented, and published the ratio of *vis viva* between wave-propagation and oscillating particles five years before it was announced by Maxwell. On Dec. 16, 1864, he received the Magellanic gold medal of the American Philosophical Society for discovering numerical relations between gravity and magnetism. In 1881 he showed that the law of phyllotaxy, or tendency to division in extreme and mean ratio, which Peirce and Hill had found in planets as well as in plants, also prevails in the atomic weights of chemical elements. His physical papers were originally published in the *Proceedings* of various scientific societies and in journals of science. He published *Elements of Meteorology* (1884). He died December 17, 1886.

CHASE, Salmon Portland (1808–1873), an American statesman, chief-justice of the supreme court of the United States, was born in Cornish, N. H., Jan. 13, 1808. He was sixth in descent from Aquila Chase, who settled in the town of Newberry, Mass., in 1640. When he was eight years old, the family removed to Keene, N. H., and he was placed at a boarding school at Windsor, Vt. The next year his father died suddenly, leaving the family in straitened circumstances; but his uncle, Bishop Philander Chase, sent for the boy to come to the West. While at the bishop's residence at Worthington, near Columbus, his time was divided between study and work on a farm. In 1822, Bishop Chase was elected president of Cincinnati College, and Salmon entered that institution, but afterward entered the junior class in Dartmouth College, and graduated in 1826. He then went to Washington, hoping to get employment in the public service, but, being disappointed, opened a "select classical school." He was admitted to the bar in 1829, and removed to Cincinnati, where he commenced practice in March, 1830. During his leisure he prepared an edition of the statutes of Ohio, with annotations and an historical introduction. This work brought him into notice, and in 1834 he was appointed solicitor of the Bank of the United States at Cincinnati. Although the business community of that city was then strongly pro-slavery, the young lawyer did not hesitate to avow his opposition to the extension of slavery, and to take a personal and professional interest in the defence of fugitive slaves and the protection of abolitionists. When a mob sacked the office of *The Philanthropist* and attempted to seize its editor, James G. Birney, Mr. Chase stood at the door of Birney's hotel and detained the mob until the abolitionist had escaped. Mr. Chase in his defence of fugitive slaves, both in the State courts and afterward in the supreme court of the United States, took the ground that the article in the Constitution regarding the return of fugitive slaves did not impose on magistrates in free States the duty of catching and returning them. He also enunciated the doctrine that slavery was local and sectional, but freedom truly national, and that any slave brought within the territory of a free State became by right free.

See Vol. V. p. 42 Am. ed. (p. 435 Edin. ed.).

In 1842 occurred a case which attained national importance. A Kentucky farmer named Van Zandt liberated his slaves, removed to Ohio, settled on a farm near Cincinnati, and was ever on the alert to aid fugitive slaves in their escape. He was the original of Van Tromp in *Uncle Tom's Cabin*. One day, while carrying a wagon-load of fugitive slaves, he was stopped by a party from Kentucky, who forcibly took the slaves from him and conveyed them across the river. Van Zandt was indicted under the fugitive-slave law of 1793, and tried before the United States circuit court of Ohio, charged with "concealing and harboring." Mr. Chase acted as his counsel; but the circuit court decided against Van Zandt, and the case was carried to the supreme court, where Mr. Chase maintained that it was the "clear understanding of the framers of the Constitution, and the people who adopted it, that slavery was to be left entirely to the disposal of the several States, without sanction or support from the national government, and that the clause in the Constitution relative to persons held to service was one of compact between the States and conferred no power of legislation on Congress." The supreme court, however, decided in favor of the constitutionality of the act of 1793. Mr. Chase then carried the agitation of the slavery question into the field of politics.

In the struggle which culminated in the overthrow of that institution, Mr. Chase was most efficient in making the opposition to slavery a power in national politics. He showed the necessity of changing what had been a philanthropic sentiment into the keynote of a political organization. In December, 1841, he was a prominent member of a State anti-slavery convention which assembled at Columbus and drafted the address which it issued to the people. In 1843 he was active in the first National Liberty Convention, at Buffalo, N. Y. He originated and organized the Southern and Western Liberty Convention which was held at Cincinnati in June, 1845, with two thousand delegates, to protest against the usurpations of the slave-power. In connection with it, he prepared an address giving a history of the progress of slavery and urging the necessity of a political organization to resist its further encroachments. At the second National Liberty Convention (1847) he had opposed the making of a national nomination; but when his hopes of action by the two great parties were disappointed, he called a free-territory State convention at Columbus (1848), which led to the National Convention at Buffalo in the same year. The latter, over which Mr. Chase presided, nominated Martin Van Buren for President and Charles Francis Adams for Vice-President of the United States.

On the 22d of February, 1849, Mr. Chase was elected United States Senator from Ohio. He advocated the construction of a railroad to the Pacific, a system of cheap postage, and a reform in the public expenditures, and took, of course, a prominent part in

the debates on the Fugitive-Slave law of 1850, the Nebraska bill, and other questions relating to slavery. Upon the expiration of his senatorial term, in 1855, he was elected governor of Ohio; and when the Republican party held its first National Convention, in 1856, he was the choice of many of the delegates for the Presidential nomination, but at his own request his name was withdrawn. At the close of his first term he was renominated for governor, and elected by the largest vote ever yet cast for an incumbent of that office in Ohio.

Mr. Chase was a prominent candidate for nomination by the Republican National Convention at Chicago in 1860, but on the third ballot, when Lincoln wanted only four votes to ensure his nomination, Mr. Chase's friends gave these before the result was announced.

In March, 1861, Mr. Chase had just taken his seat for a second term in the United States Senate, when Mr. Lincoln, without consulting him, nominated him for Secretary of the Treasury. He was unwilling to accept a place in the Cabinet, and it was only the earnest solicitations of his political friends that induced him to "surrender a position every way more desirable to take charge of the finances of the country under circumstances most unpropitious and forbidding"—a position which he afterward declared filled him with "crushing responsibility." When he took office, the finances were in a state of chaos, the current revenues not being sufficient to meet the current expenses even in a time of peace. Mr. Chase had faith, however, in the boundless resources of the nation and the self-sacrificing patriotism of the people of the North. He soon infused this confidence into Congress, and, whatever difficulty there was in the conduct of the war, the finances were managed without disaster or serious embarrassment. When the war assumed gigantic proportions and a million of men had to be maintained in the field, his financial genius enabled him to raise, when necessary, three millions of dollars a day. He was the originator of the legal-tender notes of the United States popularly called "greenbacks." To him, also, is due the credit of devising the excellent system of national banks, which did much to assist the government during the war, and has since been of essential service in developing the resources of the country. (See BANKING.)

Mr. Chase resigned the secretaryship of the treasury June 30, 1864, on account of a difference of opinion with President Lincoln as to the appointment of subordinate officers. But the continuance of the President's high regard for him was shown when, on Dec. 6, 1864, Mr. Chase was nominated to be the chief-justice of the supreme court of the United States. The appointment was confirmed by the Senate unanimously and without any reference. Mr. Chase's previous training had not been in the direction of the august position which he was now called upon to fill. For more than fifteen years he had relinquished the practice of his profession; he had never before held a judicial office; his whole life had been passed amidst the strife of politics. Yet the able, impartial, and patriotic manner in which he discharged his judicial duties was a surprise to his friends, to the profession, and to his country. One of his most important duties as chief-justice was to preside over the impeachment trial of President Johnson, in 1868. This was the first time in the history of the United States that a President had been impeached, and the trial was watched with the most profound interest, not only in this country, but throughout the civilized world. Chief-Justice Chase presided over the court of impeachment with a dignity and an impartiality that form one of his noblest titles to fame.

When the National Democratic Convention met at New York on the 4th of July, 1868, Chief-Justice Chase was prominently mentioned as a candidate who could "unite the progressive Democrats and the reasonable Republicans upon a platform which should save the rights of the States without perilling any of the results of the war." But it was too early for a new departure in politics, and the "Chase movement" of 1868 was a failure. When the nominating convention met in 1872, the chief-justice was physically incompetent, and he failed to obtain the Presidency, to which he had aspired.

Mr. Chase first showed serious symptoms of declining health in the early part of 1870. He was a man of commanding presence and splendid physique, but years of constant and tremendous labor finally undermined his great strength. When Secretary of the Treasury, it was his regular habit to spend eight hours each day at the department, rarely leaving his desk unless to attend a Cabinet meeting. He was always an early riser, and when the day was fair he took a walk before breakfast. While he was chief-justice, he was even more closely occupied. In 1870 his judicial duties, both in the supreme and in the circuit court, detained him at Washington to the end of June. With a view of restoring his health, he then took a trip to the North-west, but received no benefit. On Aug. 16, while travelling by railroad in New York, he was suddenly attacked by paralysis. By great care and the best medical treatment he recovered sufficiently to resume his seat on the bench, but nearly three years later had a second stroke of paralysis, and died at New York, May 7, 1873.

CHASE, SAMUEL (1741–1811), an American jurist and statesman, born in Somerset county, Md., April 17, 1741. He was admitted to the bar at Annapolis, Md., in 1761, and his talents and industry, aided by his fine presence and oratorical powers, soon obtained for him a prominent place in his profession. He was a member of the colonial legislature for twenty years, distinguishing himself especially by his opposition to the Stamp Act. In 1774 he was a delegate to the Continental Congress, and in 1776, on behalf of that body, went to Canada, in company with Dr. Franklin and Charles Carroll, to obtain assistance from that province in the struggle with England. Having returned, he secured from the legislature of Maryland authority to vote for the Declaration of Independence, and afterward was one of the signers of that document. At the close of the war he was sent by Maryland to London to recover funds which that State had many years previously deposited in the Bank of England. His negotiations were successful in procuring eventually the return of six hundred and fifty thousand dollars. In 1788, having removed to Baltimore, he was appointed chief-justice of a newly-established criminal court, and in 1791 was promoted to be chief-justice of Maryland. In the Maryland Convention, in April, 1788, he had made ineffectual opposition to the ratification of the Federal Constitution, yet he afterward became one of the staunchest supporters of that instrument. In 1796, Washington appointed him an associate justice of the United States supreme court, and in this capacity he was called to enforce

obedience to the Constitution in cases which have become legal landmarks. In the circuit court held by him in Pennsylvania, John Fries and two others were in April, 1800, convicted of treason for the forcible rescue of prisoners from the United States marshal. (These criminals, however—the only Americans who have ever been convicted of treason—were pardoned by President Adams.) Another noted case was that of Callender, a printer, who was convicted at Richmond, Va., of violating the Sedition Act. In both these cases, which were chiefly political, Judge Chase's conduct was so domineering that the lawyers for the defence withdrew from the court.

After Jefferson had succeeded to the Presidency, Congress made great changes in the Federal judiciary, which led Judge Chase to say, in his address to the grand jury at Baltimore, May 2, 1803, that the new laws were rapidly destroying protection to property and to personal liberty. Jefferson at once suggested to the leaders of his party that this harangue was ground for impeachment, and in the next year the House of Representatives, under the lead of John Randolph, framed eight articles of impeachment against him, which were presented to the Senate Jan. 2, 1805. Of these articles, one related to the Fries trial, five to that of Callender, one to Chase's treatment of a Delaware grand jury, and, finally, one to the real occasion of the whole proceeding. The trial lasted from Feb. 9 to March 5, 1805, and resulted in his acquittal on five of the articles, while on the other three a bare majority, instead of the requisite two-thirds, sustained the charge. The highest vote against him (nineteen to fifteen) was on the last article. He was therefore discharged, and resumed his place on the bench, which he retained till his death, June 19, 1811.

CHASE, THOMAS, LL.D., an American educator, was born at Worcester, Mass., June 16, 1827. He graduated at Harvard College in 1848, and in 1850 became an instructor there. In 1853 he visited Europe, travelling extensively in Italy and Greece and studying at the University of Berlin. Returning in 1855, he was made professor of Greek and Latin literature at Haverford College, Pa. In 1875 he became president of this institution, which is conducted by the Society of Friends. He was one of the American Committee of Revision of the English translation of the New Testament. Among his publications are—*Hellas*, a narrative of his journey in Greece, school editions of *Vergil*, *Horace*, *Livy*, *Juvenal*, and the *First Book of Cicero's Tusculan Disputations*, and a *Latin Grammar* (1882). His text-books have had a wide circulation, and he has also contributed to reviews, encyclopædias, etc.

CHASLES, MICHEL (1793–1880), a French mathematician, born at Épernon (Eure-et-Loir), Nov. 15, 1793. He was educated at the Polytechnic School of Paris, which he quitted in 1814. He acquired a high reputation as a geometrician, and displayed great erudition in numerous contributions to the *Comptes Rendus* of the Academy of Science and other scientific journals. He discovered new methods, by which he resolved, without the aid of algebra, the most difficult questions of geometry. In 1841 he was appointed professor of geodesy and machinery in the Polytechnic School, and in 1846 he obtained the chair of higher geometry in the Faculty of Sciences, Paris. He became a member of the Institute in 1851. A memorable event in his career was his defence in 1867–69 of the forged documents by which an attempt was made to transfer to Pascal the credit of Sir Isaac Newton's mathematical discoveries. He died Dec. 19, 1880. His principal works are *Aperçu historique sur l'origine et le développement des méthodes en géométrie* (1875), *Sur l'Attraction des ellipsoïdes* (1835), *Traité de Géométrie Supérieure* (1852), *Traité des sections Coniques* (1865), and *Rapport sur les progrés de la géométrie* (1871). He is regarded as the founder of the new or higher geometry.

CHASTELLUX, FRANÇOIS JEAN, MARQUIS DE (1734–1788), a French general and author, was born at Paris in 1734. He entered the army at an early age, served in Germany as colonel during the Seven Years' War, and in 1780 came to America as major-general in Count Rochambeau's army. He had already gained an honorable position as a writer by his work *De la Félicité publique*, published in 1772, which was pronounced by Voltaire superior to Montesquieu's *De l'Esprit des Lois*. In 1786 he printed a few copies of his *Voyages dans l'Amérique Septentrionale*, consisting of his journal while serving in this country, and containing interesting sketches of prominent men and events of the Revolutionary War. An English translation by George Grieve was published soon after in London. In the same year he translated into French the poetical *Address to the Armies of the United States of America* by Col. David Humphreys, which was well received at the French court. He also published in 1787 *Discours sur les Avantages et les Désavantages qui résultant pour l'Europe de la Découverte de l'Amérique*. In this he decided that Europe had gained more than it had lost by the discovery of America. In 1787 he married Miss Plunket, a young lady of Irish birth. He died at Paris, Oct. 28, 1788.

CHAT, a name applied to several different birds, even of distinct families: I. In Europe to species of shrikes, family *Laniidæ*, genus *Euneoctonus*, as the wood chat, *E. rufus*; II. In Europe and America to any of the birds of the sub-family *Saxicolinæ*, genus *Saxicola* and its subdivisions; one of these, the stone chat or wheat-ear (*S. œnanthe*), also occurring in North America; III. In the United States to the species of the genus *Icteria* (*I. virens* and var. *longicauda*), now usually classed in a sub-family, *Icteriinæ*, of the family *Sylvicolidæ*, though not without some relationship with the vireos (*Vireonidæ*). The yellow-breasted chat (*I. virens*) is the largest of the *Sylvicolidæ*, being 7 inches or more in length, the wing and tail about 3, both rounded; the bill stout, high, compressed, with curved culmen, unnotched top, and unbristled rictus; the upper parts uniform olive-green, the under golden-yellow, white from the breast backward; wings and tail colored like the upper parts; under eyelid, superciliary and maxillary lines, white. It inhabits the United States, chiefly E. of the Mississippi and N. to New England, being replaced in the W. by var. *longicauda*. It is an insectivorous bird, of rather delicate nature, migratory, usually appearing late in April or in May, spending the summer with us, and retiring beyond our limits in September. It is an abundant inhabitant of shrubbery and low tangle of any kind, but is very shy and secretive, and oftener heard than seen, excepting in the pairing season, when it mounts high on wing and performs the most extravagant aërial antics, singing the while with great volubility. The song is loud and almost endlessly varied; it has also a peculiar ventriloquial quality, serving to strangely mislead the hearer as to the whereabouts of the musician. The nest is built in a bush near the ground: the eggs are

four or five in number, white, speckled, and dashed with reddish-brown. The Western variety is very similar, but rather grayish-olive above, and with a rather longer tail; its habits are the same. (E. C.)

CHATTANOOGA, a city of Tennessee, and county-seat of Hamilton county, is situated on the south bank of the Tennessee River, 152 miles south of Nashville, and within four miles of the boundary-line of the State of Georgia. It is compactly built at the foot of Lookout Mountain, from whose summit can be seen the site of the contest popularly known as the "Battle Above the Clouds," the mountains of five different States, the beautiful landscape of "Moccasin Bend," and the battle-fields of Missionary Ridge and Chickamauga, together with the Federal and Confederate cemeteries. In 1870 the population was 6093; in 1880, 13,000; and in 1890 it had reached 29,109, of which 7000 were colored. Six railways terminate in the city the Western and Atlantic, the Nashville and Chattanooga, the East Tennessee, Virginia and Georgia, the Memphis and Charleston, the Alabama Great Southern, and the Cincinnati Southern. River navigation is open by steamboats to Knoxville on the east and to Decatur on the west for about eight months of the year, and to boats of light draught the entire year. Since the Muscle Shoals Canals were completed in 1885, the city has water-communication with all points on the Mississippi and Ohio rivers.

The manufacture of articles of iron and wood constitutes the chief industry. There are rolling-mills for the making of iron and steel rails, merchant bar-iron, cotton ties, bolts, railroad-spikes, and nails. There are also two large blast-furnaces, one of the largest oak-bark tanneries in the world, and factories for the manufacture of railway-cars, engines, and boilers, stoves scales, iron and wooden pipes, pumps, furniture, sash and blinds, cotton yarns, mineral paints, ploughs, fire-brick, handles, and spokes. There are also saw-mills and planing-mills. The city is supplied with gas from two companies, with the electric light, and with water, and has street railways, telephone and telegraphic communications. It has a healthy climate and a good system of sewerage. There are two banks, four hotels, eighteen churches, an Iron and Coal Association, a Board of Trade, an opera-house, a university (Methodist), ten well arranged schoolhouses, with an excellent system of public schools, an orphans' home, one daily and three weekly newspapers.

Between the city and Missionary Ridge rises a beautiful knoll, occupied by the National cemetery, where are buried fourteen thousand Federal soldiers. Nearer the bank of the river rises the Confederate monument, around which sleep the dead of that army—about seven thousand. The National cemetery is cared for by the national government, and the Confederate cemetery by an association of ladies. The battle-field of Missionary Ridge is now converted into peach-orchards and vineyards, and the slopes are devoted to the cultivation of strawberries, which are shipped to the North in large quantities. The mountains that surround the city are rich in iron ore and coal, and are covered with the best of manufacturing woods. They are also becoming noted as health resorts, because of their coolness in summer and their warmth in winter.

In 1838 the city was laid out. In 1843 it missed being the capital of the State by only two votes in the Senate. During the war it was an important strategic point. It was first known as Ross's Landing

CHATTANOOGA, BATTLE OF. Immediately after the battle of CHICKAMAUGA (*q. v.*), which was fought on the 19th and 20th of September, 1863, Gen. Rosecrans had strongly fortified Chattanooga to withstand the Confederate siege from the east and the south, which was at once laid by Bragg. By an order from Washington of October 16 he was relieved from his post, and on the same date Gen. Grant was appointed to the command of the Military Division of the Mississippi, comprising the three departments of the Tennessee, the Cumberland, and the Ohio. At his suggestion Thomas was placed in charge of the Department of the Cumberland in place of Rosecrans, Sherman taking that of the Tennessee, and Burnside (soon to be relieved by J. G. Foster) that of the Ohio. Sherman was ordered to bring his army as rapidly as possible from the Mississippi to Chattanooga. He collected his scattered detachments and set out by the Memphis and Charleston Railroad for a portion of the way, and thence in a straight line for Bridgeport, below Chattanooga. Sherman preceded his troops in person to meet Grant. On the 19th of October, Grant, learning that the town was in great straits, had telegraphed to Thomas to hold out to the last extremity, and had received an answer that he would "until he starved." On the 23d, Grant was at Chattanooga, where he found a worse condition of things than he had expected. The Union army lay posted outside the town, with its flanks upon the Tennessee, near the mouth of Chattanooga and Citico creeks. The enemy lay in an immense irregular circle all along the western slope of Missionary Ridge, thence across the Chattanooga Valley and river to the "nose" of Lookout Mountain, the upper terraces of which were likewise fortified and armed with cannon and mortars. Lookout Valley was occupied by Confederate troops guarding the roads to the river, and all along the south bank of the river below were strong picket-lines commanding Brown's Ferry, six miles below Chattanooga, and completely closing river-communication with Bridgeport, thirty miles below. The only way the Union army could obtain supplies was over the Anderson road across Waldron's Ridge from Stevenson, making more than seventy miles of wagoning. One large supply-train, with quantities of ammunition besides, had been destroyed by Gen. Wheeler's cavalry. The constant rains had rendered the roads very difficult. Everything that attempted to pass into the town was shelled from Lookout. The animals—cavalry and artillery horses and mule-teams—were dying for want of food. It is estimated that during this dearth ten thousand of them perished. The artillery was almost useless, for want of horses. The troops were on half rations, with prospect of less. They must have supplies, or retreat; and retreat without supplies meant annihilation.

Grant's appearance was the first gleam of hope. Troops would not be wanting; Sherman was coming. Hooker, with a strong detachment of the Army of the Potomac (20,000), was on his way, marching upon Bridgeport with the purpose to proceed up the river and seize the wagon-road between Bridgeport and Brown's Ferry. Palmer, following Hooker with the Fourteenth Corps, was to march on the north bank to a point opposite Whitesides. To facilitate these movements, which certainly would have been contested by the enemy, the following stratagem was resorted to with success. Gen. W. F. Smith (Baldy), of the Engineers, was ordered to take 4000 picked men to be thus used:

With 1800, under Gen. Hazen, he was to drop down the river at night and in silence around the great loop or bend from south to north to Brown's Ferry, six miles below. This was done in sixty ponton-boats on the night of October 27 without their having been discerned by the enemy. This force at once seized the range of hills three miles below Lookout Mountain, covering the roads to the enemy's position. In the mean time, the remainder of the 4000 (2800) had marched by the north bank of the river to the same point, where, with great celerity, they laid down a ponton-bridge nine hundred feet long, and crossed. On the 28th, Hooker came up from below, with Howard's Eleventh Corps and Gurney's division of Slocum's Twelfth, crossed to the south side, and boldly marched up Lookout Valley as far as Wauhatchie. Palmer soon followed with the Fourteenth Corps. Thus at a dash two roads were secured—one from Bridgeport to Brown's Ferry, and the other from Brown's to Kelly's. The wagoning of supplies was at once reduced from seventy miles to eight, and, although it took a little time to supply the great deficiency, there was a decided change in the situation.

The Confederate general, who had been sanguine that the Union army would be starved out, was thus rudely awakened. Longstreet, who occupied Lookout, threw himself with great impetuosity upon the right of Hooker in the valley. At first Geary's division was in great danger, but Howard came up to his support, and not only drove him back, but advanced and seized the remaining crest west of Lookout Creek. Two steamers captured from the enemy, and a third from Chattanooga, rapidly repaired, were bringing up supplies as fast as possible, and Grant could now proceed to carry out his plans for dislodging the enemy.

Just at this time Bragg made the inexcusable blunder of detaching a large force in the face of a vigilant enemy. Hearing that Burnside was about to occupy Knoxville, he ordered Longstreet to proceed thither and destroy him. In spite of more timid suggestions from Washington, Grant sent orders to Burnside to hold Knoxville to the last extremity. Sherman was hurrying up with the Fifteenth Corps and one division of the Sixteenth, all under Gen. Frank Blair. On the 14th of November he arrived, marching from Bridgeport by way of Whitesides; thence he proceeded to take up his post on the north bank of the river, near the mouth of the South Chickamauga, forming the left of the Union line, to watch the enemy at the northern end of Missionary Ridge. Thomas, keeping open communication with him, was to attack their centre on the Ridge. The most of Howard's corps was held in reserve on the north bank. A cavalry force was sent to the right and rear of the enemy to cut the railroad between Cleveland and Dalton.

Deserters coming in reported that Bragg was falling back, and some color was given to this statement by a letter which he had sent to Grant on the 20th of November, advising him to send all non-combatants out of the devoted town. In order to test the question rather than to bring on a general action, for which he was not yet quite prepared, Grant ordered Thomas to make a general reconnoissance in his front on the morning of the 23d. To this end Wood's division was ordered forward, and supported successively by divisions from the corps of Palmer and Howard, Sheridan's division of the latter corps playing a conspicuous part in the movement. These troops, moving out from Fort Wood in two lines and in full sight, manœuvred in so orderly a manner that the enemy thought it was a grand drill or review. The west side of Missionary Ridge is steep and rugged, and the crest is from 400 to 600 feet high; at its foot were rifle-pits. Midway between it and Fort Wood lies a slight eminence called Orchard Knob. The Union lines moved forward, quickening their pace until they had charged upon Orchard Knob and run up some guns; they entrenched themselves there, and waited for the developments of Sherman and Hooker.

Sherman began his movement on the same day, the 23d. One brigade was with the pontons in North Chickamauga Creek, west of the Tennessee. At dark they drifted down, landed a regiment just above the South Chickamauga, to capture the Confederate pickets; thence falling below, they laid two ponton-bridges, one, of 1400 feet, across the Tennessee, and another, for cavalry, across the South Chickamauga. By daylight Sherman had 8000 men across; by three in the afternoon his whole army was over and entrenched near the railroad tunnel. Col. Long, of the cavalry, moving rapidly around the Confederate right, destroyed Tyner's Station, on the railroad from Chattanooga to Cleveland, also the dépôt at Cleveland and a gun-cap factory. He took numerous prisoners and destroyed many wagons. Bragg thought this movement threatening his right was to be the real attack, and acted accordingly.

Sherman and Thomas being now in position, where was Hooker? On the 24th of November he climbed the west slope of Lookout Mountain, driving the enemy before him and taking numerous prisoners; thus the very last of the blockade came to an end. Henceforth there was no wagoning of supplies at all. Steamers plied unmolested from Bridgeport to Chattanooga, and there was plenty in all the camps. Leaving a small force on the mountain, he marched his column round the "nose," or northern slope, into and across the Chattanooga Valley and river, where he was delayed for three hours by a broken bridge. Then he marched upon Missionary Ridge to make an additional diversion in favor of Thomas, who was impatiently waiting for his appearance.

Meantime, there was going on a harmless artillery duel at Orchard Knob, while Bragg, rather neglecting Thomas and Hooker, directed his principal attention to Sherman, who lay in the most exposed position, and whose part in the great battle was rather to bear than to do. In front of his position lay a valley, then beyond a hill, commanded by another and higher hill in rear. Grant saw from his advanced position on Orchard Knob that Bragg was massing his troops in front of Sherman, and at one time he ordered Baird's division to reinforce him, but, finding that Sherman could hold his own without aid, Baird was retained and placed between Wood and the troops of Howard. The Confederates, to make up for a manifest deficiency in numbers, were strongly entrenched on the Ridge, their right commanded by Hardee and their left by Breckenridge.

Thus matters stood when Bragg committed his next great mistake. He weakened his centre to strengthen his right and overwhelm Sherman. Like Napoleon at Austerlitz, Grant profited by the error. All eyes were now upon the Rossville road, by which the arrival of Hooker was expected. Six discharges of field-pieces were to be the signal of his coming, and the first boom was heard at twenty minutes to four P. M. At once everything was in wild movement. Wood, Baird, and Johnston poured upon the rifle-pits at the foot of the Ridge. There they were to have stopped and waited for orders: but, as they saw the enemy swarming out of

the pits, they rushed forward without orders, followed soon, however, by an aid de-camp shouting, "Take the Ridge if you can." As they moved, the Union artillery, thundering over their heads, swept open a path in their front. The men seemed to strain every nerve in the upward race; at sunset they were on the top. Hooker, coming up on the right, met but little resistance. The attacks on Sherman had ceased. The entire Confederate force, rushing down the eastern slope in disgraceful panic, sought safety in rapid flight. Night put an end to the contest. There was no general pursuit. Bragg abandoned all his positions and took post at Ringold and Dalton, but not before he had lost 6000 prisoners, 40 guns, and 7000 stand of small-arms. The next morning a strong reconnoissance was made by Sherman with troops from Hooker and Palmer; this was so fiercely resisted by the Confederate general Cleburne at White Oak Ridge that there were no further demonstrations.

The Federal army was about 80,000 strong; that of Bragg, about 50,000. The losses of the former did not exceed 5000; those of the Confederates were greater, and their loss in prisoners very great. (H. C.)

CHATTEL, in law, every species of property of less dignity and importance than a freehold estate in land. The term is derived from the Latin *catalla*, primarily signifying beasts of husbandry only, but in its secondary sense is applied to all movables in general. Chattels are of two kinds—viz., chattels real and chattels personal. Chattels real are those interests in land which are regarded by the common law as of less dignity than freehold interests therein. They comprise estates for years, from year to year, at will, at sufferance, and by *elegit*.

Chattels personal are properly things movable which may be transported at the caprice of the owner from place to place; such are animals, household stuffs, corn, jewels, garments, books, furniture, and the like. They also comprise all incorporeal rights arising from and out of things movable, such as an interest in a mercantile partnership or a mortgage of furniture, or the like.

Whether stock in a railroad or canal corporation owning necessarily large pieces of real estate is to be regarded as a chattel or as realty was originally much disputed. In England it is generally deemed realty unless the contrary is provided by statute. In the United States, on the contrary, it is almost universally regarded as a chattel. In the United States, prior to the War of the Rebellion, slaves were generally regarded as chattels personal, and in case of intestacy passed to the executor or administrator as such. In Louisiana and Kentucky they were, however, regarded as real estate. In those States where slaves were considered as chattels they were in consequence liable to be sold, mortgaged, or leased absolutely, at the will of their masters; they could be taken into execution and sold like other chattels for payment of debts or legacies; an action on the case lay for an injury to them as for an injury to other personal property; and, finally, the ownership of their offspring was governed by the laws applicable to brute beasts. (L. L., JR.)

CHATTEL MORTGAGE, a mortgage upon chattel property—usually, in practice, upon personal chattels or movable articles. When chattel interests in real property or choses in action are to be used as security, an assignment, either expressed to be conditional and for the payment of the debt, or absolute in form, but accompanied by some counter-engagement for a return upon payment, is ordinarily employed, and is spoken of as "an assignment for collateral security." There may, however, undoubtedly be a mortgage of a chattel real—: of a lease for years, for example. A chattel mortgage differs from a pledge or pawn in this—viz., that in the former the title to the property mortgaged passes in law at once to the mortgagee upon failure of the mortgagor to comply with the conditions of the mortgage. In the latter the title to the thing pawned does not pass to the pawnee immediately upon the default of the pawnor. It remains vested in the pawnor until such time as the chattel is sold by the pawnee; and even then the pawnor remains entitled to all that portion of the purchase-money which exceeds his debt with interest.

A chattel mortgage differs from a conditional sale in this—viz., that at the time of the execution there is always a debt from the mortgagor to the mortgagee, either due or actually in prospect, upon failure to pay which within a stipulated time the title is to rest in the mortgagee. In the case of a conditional sale no question of a debt due from the vendor to the vendee is involved. The vendor simply retains the right, within a stipulated time and upon stipulated terms, to reclaim his property.

As in the case of mortgages of real estate, a chattel mortgage will be decreed to be such by the courts, even though it may be in the guise of an absolute or conditional sale. The true intent of the parties will always be regarded in such cases. As a rule, the retention of possession of mortgaged chattels by the mortgagor constitutes evidence of fraud as against subsequent *bonâ fide* purchasers and mortgagees, which must be submitted to a jury. In Pennsylvania and Illinois the courts go further, holding that in such cases the retention of possession constitutes an irrebuttable presumption of fraud. In those States, accordingly, a chattel mortgage unaccompanied by delivery of possession is regarded as void except as to parties to the contract.

In almost all the United States, however, statutes have been enacted for the purpose of enabling mortgagors to retain possession of mortgaged chattels, and at the same time to give mortgages which shall secure their creditors as effectually as though possession of the property had actually been transferred. This purpose is accomplished by substituting a record or filing of mortgages in place of a delivery of possession of the mortgaged property. The statutes, in effect, make a recording or filing of the instrument equivalent to a change in the possession of the property.

The provisions of these statutes differ materially in the various States. They generally stipulate that the mortgage shall be filed in the town or county constituting the residence of the mortgagor. In some States it is provided that in case the mortgagor be a non-resident the mortgage shall be recorded in the city or town where the property is situate at the time the mortgage is executed. Such is the law in Illinois, Kansas, Maine, Massachusetts, Michigan, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Rhode Island, South Carolina, Tennessee, Texas, Wisconsin, and Vermont.

In other States it is provided that a mortgage of chattels shall be recorded both where the mortgagor resides and where the property is located. Such is the law in Alabama, Arizona, California, Georgia, Idaho, and Minnesota. In Colorado, Connecticut, Dakota, Delaware, Florida, Kentucky, Mississippi, New Mexico, Virginia, West Virginia, Washington Territory, and Wyoming a chattel mortgage need only be recorded in the county where the property is situate at the time the mortgage is made.

In some States, where the property ...d dur-

ing the continuance of the mortgage, the record thereof must also be transferred to render it effectual. Such is the case in Alabama, California, Mississippi, and Wyoming. In some States a record ceases to be of any effect after a limited period from the original filing of the mortgage, as in Colorado, Minnesota, Montana, Nebraska, Wyoming, and Illinois. But provision is made in several States for a refiling of the mortgage, as in Arkansas, Kansas, Michigan, New Jersey, New Mexico, New York, Ohio, Oregon, Wisconsin, and Dakota.

In Louisiana and Nevada there are no laws authorising the recording of chattel mortgages. In Pennsylvania the statutes sanction the recording of chattels real in the county where the realty is situate.

The foreclosure of chattel mortgages is effected by a sale of the property mortgaged by the mortgagee, after due notice to the mortgagor both of the amount due and of the intended sale. In some States peculiar forms of foreclosure are provided by statute.

(L. L., JR.)

CHAUNCEY, ISAAC (1772–1840), an American naval officer, was born at Black Rock, Conn., Feb. 20, 1772. He first served in merchant-vessels, but when the navy was reorganized in 1779 he became a lieutenant, and in 1802 was acting captain of the frigate Chesapeake. During the operations against Tripoli he served actively under Commodores Preble and Rodgers. In 1804 he was appointed master-commandant, and in 1806 captain. During the peace which followed the Algerine war he was stationed at the navy-yard at New York. On the outbreak of the war of 1812 he was placed in command of all the lakes except Champlain. Arriving at Sackett's Harbor Oct. 6, 1812, he used great exertions to prepare a fleet, guarding also against an attack by the enemy. Late in April, 1813, he carried Gen. Dearborn's army to York (now Toronto), hoping at the same time to capture some vessels and gain the mastery of the lake. York was taken, the Government buildings fired, and three days later the American troops re-embarked and were taken to Niagara. Little had been gained by this expedition, and the British had offset it by an attack on Sackett's Harbor, then almost defenceless, and, though repulsed, caused the loss of an immense amount of military stores. In October, Chauncey encountered a British fleet of seven vessels, five of which he captured. In 1814, while the land-forces carried on the war in Upper Canada, he was inactive until August, when he appeared off Kingston, and blockaded the fleet of Sir James Yeo for six weeks. Peace was concluded before operations could be resumed, and Chauncey returned to his command of the navy-yard at New York. He was afterwards one of the navy commissioners, and in 1833 was made president of the board, which position he held till his death, at Washington, Jan. 27, 1840.

CHAUTAUQUA. Chautauqua, on Chautauqua Lake, in Chautauqua co., Western New York, is the centre of an educational movement which has acquired considerable prominence during the past seventeen years. It is a practical answer to the several important problems which present themselves again and again to thoughtful students of our American society and institutions.

The place is very beautiful for situation. It is on a point that projects into the lake, giving a fair prospect [illegible] and down and across its blue waters for miles, and [illegible]rding easy landing-places for steam and sail craft. [illegible]grou[illegible]rises gradually from the pebbly beach to [illegible]of 125 feet, making it one of the highest re[illegible]he lake. Here is built a summer city in the midst of the original forest, cleared out, trimmed, and fitted for the purpose. Five hundred cottages (some of them costing as much as $5000), stores, markets, parks, fountains, statuary, flowers, ferneries, swings, museums, and lawn-tennis grounds, piers, avenues, railway-stations, public buildings which have cost $150,000, together with a hotel costing $100,000. Every part is illuminated with the electric light. The departments of streets, police, and water-supply are well organized and efficient. The sewage and sanitary arrangements are not excelled, if equalled, by any city in the United States. The water-supply is taken from the bottom of the lake, directly from its purest sources, and forced through pipes to a large reservoir which supplies all parts of the grounds.

The Chautauqua movement began in 1874, through the joint suggestions and plans and labors of Lewis Miller, Esq., of Akron, Ohio, and Bishop J. H. Vincent. Its original intention was to utilize the summer recreative instinct, necessity, and habit in the interest of worthier ends than those which usually control "summer resorts." The founders, having been for years especially interested in Sunday-school work, proposed to turn the leisure of summer tourists into opportunity for biblical, educational, and especially Sunday-school work. Innocent recreations, music, fireworks, brilliantly illustrated scientific lectures, stereoscopic displays, etc., were employed the first year, in connection with a series of lectures on biblical, social, and other general subjects.

The success of the first year encouraged the projectors of the institution to widen its scope, without losing sight of the original intention of the Chautauqua Assembly. One of the great problems of the day is how to interest our young people in worthier lines of reading and conversation during the week. The Sabbath-school, at its maximum of an hour and a half on the Sabbath, is unable to neutralize, without especial effort in that direction, the dissipating, if not demoralizing, influences which are at work through the whole week. It was believed that these week-day forces might be controlled in the interest of moral and intellectual improvement. In pursuance of plans projected long before the beginning of the Assembly, a literary and scientific circle was organized in 1878, the design of which was to promote habits of reading and study in nature, art, science, and in secular and sacred literature, in connection with the routine of our daily life, especially among those whose educational advantages have been limited, so as to secure to them the college student's general outlook upon the world of thought and life, and to develop the habit of close, connected, and persistent thinking. William Cullen Bryant was consulted in regard to the details of this plan, and gave it his unqualified indorsement in a long letter written to Bishop J. H. Vincent a few weeks before the poet's death. The course of study adopted by the "Chautauqua Literary and Scientific Circle" covers four years, requiring from each member an average of forty minutes' reading a day. The Circle becomes, in fact, a home-college for old and young, and had attained a membership, by its tenth anniversary, in 1888, of over 200,000, with local circles, not only throughout this country, but in Canada, Great Britain, in Japan, South America, South Africa, Australasia, etc. The first "Recognition Day" of the "C. L. S. C." was held Aug. 12, 1882, when more than 1600 graduates were rewarded with diplomas (not degrees). Eight hundred of these were present, one of them being a lady eighty years of age.

The Chautauqua meetings are held for seven weeks during the summer. They embrace sessions of the Chautauqua College of Liberal Arts for the study of Language, Literature, Science and Art; the "Chautauqua Teachers' Retreat," for the benefit of secular educators; the "Chautauqua Missionary Institute," for the quickening of all the churches in the home and foreign missionary work; the "Chautauqua Sunday-school Assembly," for the increase of biblical and Sunday-school knowledge and ability; the "Chautauqua Literary and Scientific Circle," annually meeting for reports, lectures, etc. The exercises for the seven weeks are very interesting. Able lectures from men of renown, magnificent concerts, class-drills, children's meetings, brilliant illuminations, bonfires, fireworks, innocent recreations, the model of Palestine (over 300 feet long), the Children's Temple, the Art and Archæological Museum—all of these attract to Chautauqua every summer tens of thousands of persons interested in its work. The expenses of the programme only for the season of 1890 were $40,000.

But the principal charm in the work of Chautauqua is the ministry which it exercises at the homes of the people from January to December. The meetings for the summer give quickening, but the work is wrought in thousands of homes all over the land through the entire year—a work in which religious and scientific culture, cheerful home-life, broad views, and lofty ideals are promoted. Bishop J. H. Vincent, of the Methodist Episcopal Church, continues his intimate relation to Chautauqua. (J. H. V.)

CHAUVEAU, Pierre J. O., a Canadian statesman and author, was born at Quebec, May 30, 1820. He was the son of a merchant, and was educated at the seminary of Quebec. While studying law he began to contribute political articles to *Le Canadian* and to the *Courier des États Unis* of New York, and soon became noted as a writer. He was elected to Parliament from Quebec in 1844 and in 1848, and filled various public offices. When the Dominion of Canada was formed in 1867, Chauveau became the first minister of the government of Quebec, and so remained until 1873, when he was made speaker of the Senate of Canada. His literary reputation rests chiefly on his novel *Charles Guérin* (1850), which faithfully depicts French-Canadian life.

CHAUVENET, William, LL.D. (1819–1870), an American mathematician, born in Milford, Pennsylvania, May 24, 1819. He graduated at Yale College in 1840; was for a time employed at Girard College in taking magnetic observations in association with A. D. Bache; became in 1841 mathematical instructor in the United States Naval Asylum; held the professorship of astronomy and mathematics 1845–59 in the United States Naval Academy, of which he was one of the founders; he was at the same time director of the observatory; was appointed in 1859 professor of mathematics in Washington University, St. Louis, Mo., and 1862 assumed in addition the duties of chancellor of the university. He resigned these positions in 1869, and died at St. Paul, Minn., Dec. 13, 1870. Among his works are treatises on *The Binomial Theorem and Logarithms* (1843), *Plane and Spherical Trigonometry* (1850), *New Method of correcting Lunar Distances* (1850), *The Great-Circle Protractor* (1855), *Manual of Spherical and Practical Astronomy* (1863), and *Elementary Geometry*. He was the originator of remarkable improvements in mathematical methods, and in the practical application of scientific principles.

CHEBOYGAN, the county-seat of Cheboygan co., Mich., is on Lake Huron, near the Straits of Mackinaw and at the mouth of the Cheboygan River. It is on the Jackson, Lansing, and Saginaw Railroad, 160 miles N. of Bay City and 250 miles N. N. W. of Detroit. It has a bank, two weekly newspapers, five churches, and a union school. Its chief industry is the manufacture of lumber; it has several large saw-mills and three foundries, and ships large quantities of timber, tan-bark, and fish. It has a system of water-works. It is assessed at $1,200,000, and its public debt is small. By means of slack-water, navigation is opened to a chain of inland lakes and to Petoskey, 45 miles distant. Population, chiefly of American birth, 6244.

CHECK, or CHEQUE, a bill of exchange or draft drawn on a bank or banker, payable on demand. The law relating to cheques both in England and this country is in general the same as that relating to bills of exchange except so far as it has been modified by usage. These modifications, briefly stated, are—1. A cheque requires no *acceptance*, the bank being bound to pay it if there are funds of the drawer in its hands. If the bank marks or certifies the cheque to be "good," that amounts to an acceptance, and the bank becomes liable as an acceptor. 2. The drawer of a cheque is a principal debtor, and not, like the drawer of a bill of exchange, a surety. The effect of a cheque is to appropriate to the holder a specific sum of money in the hands of the bank. The holder may draw the money whenever it pleases him, but he runs the risk of the bank's failure or of the deposits of the drawer being drawn out if he does not present it for payment promptly. If the bank should fail before the presentation of the cheque, provided there was time to present it, the holder must bear the loss. If there are no funds of the drawer in the bank with which to pay the cheque, then the holder can look to the drawer for the money. 3. The death of the drawer countermands his cheques, although the bank would not be held liable for paying them before they received notice of his death. 4. The bank is responsible for the payment of a forged cheque if the forgery is that of the name of its depositor, for it cannot in that case charge the money to him; and if the bank pay a cheque fraudulently increased in amount, or "raised," it can only charge to the depositor the amount for which it was originally drawn. (S. W.)

See Vol. V. p. 506 Am. ed. (p. 583 Edin. ed.).

CHEESE, CHEESE-MAKING. See Dairy.

CHEEVER, George Barrell, D. D., a Congregationalist minister and author, was born at Hallowell, Me., April 7, 1807. He graduated at Bowdoin College in 1825, studied theology at Andover, and was ordained pastor of a Congregational church at Salem, Mass., in 1831. He had already frequently contributed literary articles to the *North American Review* and other periodicals, as well as taken part in the Unitarian controversy, defending the orthodoxy of Cudworth. He had also published some volumes of selections and *Studies in Poetry, with Biographical Sketches of the Poets* (1830). In 1835 he gained celebrity by publishing in a Salem newspaper a satirical allegory called *Deacon Giles's Distillery*, which was soon circulated as a broadside with rude cuts that helped to point the moral. The author was charged with having made a libellous attack on a citizen of Salem, was riotously assaulted in the street, then tried before a court, convicted, and sent to jail for thirty days. Nothing daunted by these proceedings, he soon published a similar tract called *Deacon Jones's Brewery*. The next year Mr. Cheever went to Europe, where he

travelled two years and a half, and wrote regularly for the *New York Observer*. In 1838 he took charge of the Allen Street Presbyterian Church in New York, and in 1841 published a volume entitled *God's Hand in America*, with an introductory essay by Rev. Dr. Skinner. After making a second visit to Europe, he became the editor for one or two years of the *New York Evangelist*. In 1844 appeared his *Lectures on Bunyan's Pilgrim's Progress*, which were very popular in this country, and have been issued in several editions in England. His own experience seems to have quickened his sympathy with Bunyan, and made this his best work. It was followed by his *Lectures on the Hierarchical Despotism* and a volume in *Defence of Capital Punishment for Murder*, with the notes of a public discussion on the argument. In 1846 he gave the results of his last visit to Europe in his *Wanderings of a Pilgrim in the Shadow of Mont Blanc*, and in the same year he became pastor of the Congregational Church of the Puritans, which had been built by his personal friends. In 1848 he edited and published *The Journal of the Pilgrims at Plymouth in New England*, with twenty-four chapters of historical illustrations. When the *Independent* was established at New York in 1848 he became a regular contributor to that paper, treating of religious, literary, and political topics. He wrote some allegories on the Christian life, which were published, with other miscellanies, in a volume entitled *The Hill Difficulty*. This was followed by a similar work, *The Windings of the River of the Water of Life* (1849). Nearly every year, besides his labors in the pulpit, he added a volume to his list of publications: *The Voices of Nature to the Soul of Man* (1852), *A Voyage to the Celestial Country* (1853), *The Right of the Bible in our Common Schools* (1854), *Lectures on Cowper* (1856), and in the same year a volume on *The Powers of the World to Come*. He took a prominent part in the anti-slavery agitation, and published *God against Slavery* (1857) and *The Guilt of Slavery and the Crime of Slaveholding Denounced from the Hebrew and Greek Scriptures* (1860). He also contributed to the *Bibliotheca Sacra* and other periodicals, and prepared a course of *Lectures on Bunyan's Holy War*. When the lease of the ground on Union Square, where the Church of the Puritans was originally built, expired in 1867, the congregation removed, and after some time united with a Presbyterian church in One Hundred and Twenty-ninth Street, adopting the same title, "The Church of the Puritans." Though once a preacher and writer of considerable power, his influence was gradually weakened by his wearisome discussion of successive social reforms. He died at Englewood, N. J., Sept. 30, 1890. Among his latest works were *Faith, Doubt, and Evidence* (1881), and *Views of Madame Guyon* (1886).

CHELIUS, MAXIMILIAN JOSEPH (1794–1876), a German physician and surgeon, was born at Mannheim (Baden) in 1794. He received his education in that city and in the University of Heidelberg, from which he graduated as M. D. at the age of eighteen. He became physician to the hospital of Ingolstadt (Bavaria), and afterward visited the hospitals and universities of Vienna, Göttingen, Berlin, and Paris. After this preliminary experience he received, in 1817, the appointment of assistant professor of medicine at Heidelberg. Two years later he became full professor there, and in 1826 received the title of councillor of the court of Baden. He founded at Heidelberg a clinic of ophthalmic surgery. His most important work is *Handbuch der Chirurgie* (Heidelberg, 2 vols., 7th ed. 1851), which is widely used in Germany and has been translated into several languages. An English version (*A Manual of Surgery*) was published in London in 2 vols. (1847). He also wrote *Ueber die Heilweg der Blasen-Schneiden Fisteln durch Cauterisation* (Heidelberg, 1844), *Zur Lehre von den Staphylomen des Auges* (1858), and many articles in the *Annals of Medicine*, a journal edited by himself. He died at Heidelberg, Aug. 17, 1876.

CHELMSFORD, FREDERICK AUGUSTUS THESIGER, second BARON, an English general, was born May 31, 1827. He entered the army in 1845 as an ensign in the grenadier guards. He served in the Crimea as aid de-camp to Major-Gen. Markham and took part in the Sepoy war, and in 1868 rendered distinguished service in the Abyssinian expedition. For the next six years he was adjutant-general of the Bengal army, but in 1876 he returned to England, and soon after was promoted to a major-generalship. In 1878 he was appointed to the command of the British troops in South Africa. He completed the subjugation of the Kaffirs, but was called to what proved a more serious contest with the Zulus, who, under the lead of Cetewayo, were striving to resist British aggression. In October, 1878, by the death of his father, Gen. Thesiger succeeded to the title Lord Chelmsford. His army, consisting of 18,000 men, of whom over 6000 were Europeans, invaded Zululand in four divisions Jan. 11, 1879. On the 22d, while Lord Chelmsford had gone forward with the main body of his troops, the garrison of his camp at Isandlana was surprised and massacred. The other divisions narrowly escaped the same fate, and the British army was thrown on the defensive until reinforcements should arrive from England. These were quickly sent, to the number of 10,000 men, and, though there was a loud demand for the recall of the general, he was retained in command. On March 29 he renewed the invasion, marching first to relieve Col. Pearson, who, though he had defeated the Zulus on Jan. 23, had entrenched himself at Ekowe (or Etchowe) on learning of the defeat at Isandlana. On April 2, at Ginghilova, 12 miles from Ekowe, Lord Chelmsford defeated the entire army of the Zulus, and joined Col. Pearson. On July 4, at Ulundi, where Cetewayo's royal kraal was situated, Lord Chelmsford again defeated the main army of the Zulus, amounting to 20,000 men. The Zulus now dispersed, and, though Cetewayo had not yet been captured, Lord Chelmsford sent his resignation to Sir Garnet Wolseley, who had been appointed civil and military governor of Natal and the Transvaal. After his return to England, Lord Chelmsford, both in the House of Lords and through the press, discussed the events of the war and defended his own action.

CHELONIANS. See REPTILES.

CHEMICAL ANALYSIS. As chemistry treats of the composition of material substances, the chemist must devote great attention to analysis—that is, the methods of ascertaining whether a particular substance be simple or complex, and, if complex, of determining its constituents.

As general chemistry is divided into *inorganic* and *organic*, so analytical chemistry is divided into *inorganic analysis* and *organic analysis*; and both of these are again divided into *qualitative* and *quantitative* analysis. The first of these latter branches ascertains the elemental chemical composition of any substance or mixture, and the second the relative proportion in which

See Vol. V. p. 397 Am. ed. (p. 489 Edin. ed.).

these constituents are present. Of course the successful application of the second method of analysis presupposes an acquaintance with the results of the first in any particular case.

Quantitative chemical analysis is classified, moreover, under the headings of *gravimetric* analysis, in which the material to be analyzed is weighed, and its component parts are likewise determined by weight; *volumetric* analysis, in which the composition of a substance is determined by measuring the volumes of solutions of known strength which are used in the reactions incident to the analysis; and *eudiometric*, or *volumetric, gas* analysis, which determines both the qualitative and the quantitative composition of gaseous mixtures. Organic quantitative analysis, lastly, is divided into *proximate* and *ultimate* analysis, according as the complex vegetable or animal compound is resolved into simpler compounds only, or at once into the few chemical elements which in organic compounds unite in so many different forms of molecular combination. The methods of ultimate analysis dealing with some three or four elements only are quite simple, while proximate analysis involves the use of many reagents and methods, as the various organic principles contained in plant and animal tissues have very different physical and chemical properties.

The space at our disposal will allow of only a cursory view of the most important of these several branches of chemical analysis. The methods of inorganic qualitative analysis will first be passed in review; of the two branches of inorganic quantitative analysis, gravimetric and volumetric, as the methods of the former correspond in principle almost uniformly with those of qualitative analysis, they will not be noted here, and for a description of the latter the reader is referred to manuals on the subject; eudiometric, or gas, analysis will then be noted, especially in its application to industrial gases. The subject of ORGANIC ANALYSIS will be treated under that title.

INORGANIC QUALITATIVE ANALYSIS.—In qualitative analysis the student attempts to determine the composition of the different forms of matter by applying to them *reagents*—bodies of known properties which when applied properly give him information in the form of *reactions*. The reactions yield new products, with accompanying changes in appearance and properties. When the reaction takes place between two liquids, a not infrequent result is the formation of an insoluble compound, a *precipitate*. Or the result of the reaction may be the escape of a gas with what is called *effervescence*. According to the action of reagents we can divide the metals or basic elements into six groups, the members of which are in many respects similarly affected by reagents. These six groups are:

I.	III.	V.
Potassium,	Zinc,	Arsenic,
Sodium,	Manganese,	Antimony,
Ammonium,	Cobalt,	Tin,
Lithium,	Nickel,	Gold,
etc.	etc.	Platinum,
		etc.
II.	**IV.**	**VI.**
Barium,	Iron,	Mercury,
Strontium,	Aluminium,	Lead,
Calcium,	Chromium,	Bismuth,
Magnesium.	Beryllium,	Cadmium,
	Uranium,	Copper,
	etc., etc.	etc.

Before treating of the differences of the several groups, certain preliminary analytical operations which are in constant use will be mentioned.

1. *Solution.* Some solids, when brought in contact with water or other liquid, gradually pass into the liquid state, or dissolve; such are said to be "soluble." The liquid which effects the solution is "the solvent," and the liquid obtained is termed the "solution." If the substance can be recovered without material alteration, the solution is said to be "simple;" but if a chemical change has taken place, the product is a "chemical solution." 2. *Evaporation* is the driving off of the solvent by boiling. 3. *Precipitation* occurs when, on mixing two perfectly clear liquids, turbidity ensues, an insoluble substance called a "precipitate" being formed. Precipitates differ greatly in appearance and properties, being described as flocculent, crystalline, gelatinous, etc. 4. *Filtration* consists in separating a precipitate from the liquid in which it is produced. This is accomplished by the use of filtering paper, a soft bibulous variety analogous to but looser in texture than blotting-pad paper; which paper is fitted inside of a glass funnel. In the filtration of strong acids, etc. asbestos fibre or spun-glass is substituted for paper. 5. *Decantation* is resorted to in some cases where the insoluble compound is rather heavy and separates rapidly. The liquid is removed by pouring it off with the aid of a glass rod held against the edge of the vessel, or by the use of a syphon. Precipitates are usually washed upon the filter upon which they are collected by directing a jet of distilled water upon them and continuing until the water running through the funnel is found to leave no residue on evaporation. If washed by decantation, the process is continued until the water poured off answers the same test. When it is desired to dry a precipitate, the funnel with filter can be placed on a support over a sand-bath or hot iron plate, or in a drying-oven. If it is to be ignited, it can be placed in a crucible and heated over a lamp, at first slowly, and finally to a red heat. The ash of the filter must be allowed for, of course, if the ignited precipitate is to be weighed.

The First Group.—We have no group reagent for the alkali metals, but special tests enable us to recognize them without difficulty. Any salts of *ammonium*, when heated in a dry test-tube, will volatilize, condensing again, in most cases, upon the cooler portion of the tube. When, in concentrated solution, in the presence of a little free hydrochloric acid, platinic chloride is added, a yellow crystalline precipitate is formed of the composition $(NH_4)_2PtCl_6$. This double chloride is insoluble in alcohol; it resembles that of potassium and platinum, but can be distinguished by the fact that upon ignition it leaves only spongy platinum. On warming ammonium salts with potassium hydrate or lime-water, ammonia gas is liberated, and is at once recognized by its pungent odor. The most delicate test for ammonium salts is their action with Nessler's solution (a potassium hydrate solution of potassio-mercuric iodide). This reagent produces in dilute solutions a yellowish coloration, and in concentrated solutions a reddish-brown precipitate. *Potassium* salts require an intense heat for volatilization. Their concentrated solutions, in the presence of a little free acid, yield with platinic chloride a double salt, K_2PtCl_6, analogous to that of ammonium and resembling it. This salt is somewhat soluble in water, but insoluble in alcohol. On ignition it leaves metallic platinum and potassium chlo-

nce. A ready test for potassium compounds is to dip a clean platinum wire into the solution, and then to hold it in the flame of a Bunsen burner, when we have a violet-colored flame. Sodium salts obscure the violet of the potassium; but if a piece of blue glass or a prism filled with an indigo solution be held between the eye and the flame, the yellow of the sodium flame is absorbed, and the violet color due to potassium becomes visible. The intense yellow color imparted to flame by *sodium* compounds is the best means of identifying sodium. When to a solution of sodium chloride platinic chloride is added and the solution allowed to evaporate, a double chloride, Na_2PtCl_6, results, which separates in aurora-red needles. This color and its solubility in water and alcohol distinguish it from the corresponding potassium and ammonium salts. Potassium pyroantimoniate ($K_2H_2Sb_2O_7$), in concentrated neutral solutions of sodium salts, throws down a crystalline white precipitate of $Na_2H_2Sb_2O_7$. The double chloride of *platinum and lithium*, like that of sodium, is soluble. In concentrated lithium solutions sodium carbonate produces, after some time, a white granular precipitate of lithium carbonate. With hydro-sodium phosphate, HNa_2PO_4, no precipitate is obtained in the cold; but when the liquid is boiled, there separates a white crystalline compound, lithium phosphate, soluble in hydrochloric acid, but not reprecipitated from a cold solution on the addition of ammonium hydrate. Lithium salts give to the colorless gas or alcoholic flame a rich carmine color.

The Second Group is known as the group of the alkaline earths; its reagent is ammonium carbonate. Magnesium may be considered as a separate section of this group, being distinguished from the other members by the insolubility of its hydrate, the ready solubility of its sulphate, and the non-precipitation of its carbonate, in the presence of ammoniacal salts. Again, the alkaline hydrates have no effect upon barium, strontium, or calcium salts, but precipitate magnesium hydrate from the solutions of that metal. Sulphuric acid or soluble sulphates precipitate barium readily, strontium more slowly, and calcium only in concentrated solutions or upon addition of alcohol. The three sulphates are all white in color, and differ chiefly in relative solubility. The best precipitant for calcium is ammonium oxalate. Both bichromate and neutral chromate of potassium precipitate barium chromate, insoluble in acetic acid, but do not precipitate strontium chromate from either acid or neutral solutions. All the carbonates are white and soluble in dilute acids; the sulphates of strontium and calcium are soluble in dilute acids, but that of barium is not. Barium salts impart a yellowish-green color to flame, calcium salts an orange-red, and strontium salts a crimson color. Magnesium solutions, in the presence of ammoniacal salts, are precipitated on the addition of hydro-sodium phosphate, yielding a white crystalline precipitate of $MgNH_4PO_4$. When this is ignited, it loses water and ammonia and leaves $Mg_2P_2O_7$, pyrophosphate of magnesia. From solutions of magnesium free from ammoniacal salts a concentrated solution of ammonium carbonate will, after standing some time, precipitate a double carbonate, $(NH_4)_2CO_3.MgCO_3$. This furnishes a means of separating magnesium from the alkalies. Or if the magnesium solution be free from ammonium salts, it can be boiled with barium hydrate, and magnesium hydrate will be precipitated. The excess of barium hydrate can then be removed by adding dilute sulphuric acid, and the filtrate from the barium sulphate which separates will contain only the alkalies. The following method is used in separating the members of this group when together in solution: First add some NH_4Cl, and then the group reagent, $(NH_4)_2CO_3$. A precipitate forms, which is filtered, and to the filtrate add HNa_2PO_4, when, if magnesium be present, a precipitate of $MgNH_4PO_4$ is obtained. Dissolve the original carbonate precipitate in dilute HCl, evaporate the solution to dryness, and treat the dry residue with alcohol. If insoluble in alcohol, dissolve in water, adding H_2SO_4, when, if barium be present, insoluble $BaSO_4$ will be found; but if soluble boil off the alcohol, add ammonium carbonate, filter, and dissolve the precipitate in HNO_3. Evaporate to dryness, and treat the dry residue with alcohol. If soluble, expel the alcohol, add ammonium oxalate, and calcium oxalate will be precipitated; but if insoluble, test in the Bunsen flame, when the intense red color will prove the presence of strontium.

The Third Group includes manganese, zinc, nickel, and cobalt, and has as a group reagent ammonium sulphide. The fixed alkalies, as KOH, precipitate from manganese solutions white manganous hydrate, $Mn(OH)_2$, rapidly turning brown, owing to oxidation. With zinc the hydrate is white in color and readily soluble in an excess of the reagent; with nickel the hydrate is apple-green; with cobalt is formed a blue basic hydrate which changes on boiling to a pink. Both nickel and cobalt hydrates are insoluble in excess of the reagent. The fixed alkaline carbonates precipitate the entire group; ammonium hydrate and carbonate only precipitate manganese completely. With the group reagent, ammonium sulphide, manganese yields a flesh-colored sulphide soluble in acetic and the mineral acids; while nickel and cobalt furnish black sulphides insoluble in the dilute mineral acids, but soluble in concentrated nitric acid or *aqua regia*. Of these four sulphides, nickel is the only one appreciably soluble in the group reagent. Its solubility is shown by the dark color of the supernatant liquid. Concentrating the solution and adding acetic acid will cause it to separate out. With a bead or globule of fused borax three of the four elements in this group give characteristic color—manganese, an amethyst color; nickel, a reddish-brown; and cobalt, a deep blue. Manganese compounds, also, when heated on platinum foil with sodium carbonate and nitrate, yield a bright-green mass of manganate of soda. The different effect of potassium cyanide upon nickel and cobalt solutions gives us a means of separating these elements. Potassium cyanide precipitates from nickel a dirty-green cyanide of nickel, which dissolves in excess of cyanide of potassium. From this solution the nickel may be precipitated as cyanide by careful neutralization with hydrochloric acid or as hydrated sesquioxide on addition of a hypochlorite. Boiling does not alter the double nickel salt. From cobalt solutions potassium cyanide precipitates a chocolate-colored cyanide also soluble in excess. But by boiling the solution the potassio-cobaltous cyanide is oxidized to potassio-cobaltic cyanide, which is no longer precipitable. From cobalt solutions nitrite of potash precipitates, in the presence of acetic acid, a yellow crystalline precipitate of double nitrite of cobalt and potash, while nickel gives no such result. If the four elements of this group be precipitated together as sulphides, this mixture, after washing, is to be treated with warm dilute HCl, which will dissolve MnS and ZnS, but leave CoS and NiS. On adding excess of sodium hydrate to the solution containing manganese and zinc the former only is precipitated, the latter remaining in solution. The

mixture of insoluble NiS and CoS is dissolved in concentrated HNO_3, evaporated to dryness and the two elements separated by the nitrite-of-potash method given above.

The Fourth Group includes aluminium, chromium, and iron, and has for its reagent ammonium hydrate, NH_4OH. This reagent precipitates them as hydrates, that of aluminium being white and gelatinous, only slightly soluble in excess of precipitate; that of chromium, bluish-green, soluble in excess of ammonium hydrate. With iron in the ferric condition is gotten a reddish-brown precipitate insoluble in excess of the ammonium hydrate. Ferrous solutions, if pure, yield a white precipitate of ferrous hydrate, but this very speedily oxidizes and becomes dirty-green or brown in color. The fixed alkalies precipitate the entire group, the hydrates of aluminium and chromium dissolving in excess of the reagent. Boiling will, however, cause the reprecipitation of the chromium hydrate. The alkaline carbonates behave like their hydrates except in the case of ferrous salts, where white ferrous carbonate is precipitated. The group reagent of the preceding group, $(NH_4)_2S$, precipitates aluminium and chromium as hydrates, and iron as black ferrous sulphide, FeS. The blow pipe tests are among the most characteristic with the metals of this group. Aluminium compounds heated upon charcoal, and then moistened with cobaltous nitrate and reheated, show a blue color. Chromium compounds impart a beautiful emerald-green color to the borax glass, and, fused with sodium carbonate and nitrate on platinum foil, yield a yellow mass of sodium chromate. Iron imparts to the borax glass a color yellowish while hot and light-green when cold. The ferric salts are distinguished from ferrous by the following reactions: With ferric salts, the addition of H_2S or $(NH_4)_2S$ reduces them to ferrous salts with separation of sulphur, the latter reagent then precipitating FeS. Ferrocyanide (yellow prussiate) of potash with ferric salts yields a deep-blue precipitate of ferric ferrocyanide (Prussian blue), with ferrous salts a greenish-white precipitate of ferrous ferrocyanide. With ferricyanide (red prussiate) of potash ferrous salts yield Turnbull's blue, very similar to Prussian blue in appearance, while ferric salts yield only a green-brown coloration, but no precipitate. Potassium sulphocyanate gives a deep blood red color with ferric salts even in dilute solution, and no color at all with ferrous salts. Salicylic acid is also a very sensitive reagent for ferric salts, yielding a fine purple color. Ferrous compounds are converted into ferric by heating the solutions with a little nitric acid. The reduction of ferric to ferrous compounds is best effected by the aid of hydrogen sulphide or sulphurous acid. The original solution is to be tested as to whether the iron existed in the ferrous or ferric condition, as after precipitation by the group reagent it is always in the ferric state. The members of this group, if precipitated together, may be identified as follows: The well washed precipitate is placed in a porcelain dish with sodium hydrate and some bromine water, and then warmed. The chromium and aluminium are dissolved, while the ferric hydrate remains insoluble. This latter is filtered off, dissolved in HCl, and tested with potassium ferrocyanide. The filtrate containing aluminium and chromium is tested with excess of NH_4Cl and warmed until ammonia no longer escapes. Aluminium, if present, would have been thrown down. The filtrate from the latter or the liquid free from aluminium is acidified with hydrochloric acid, hydrogen sulphide gas conducted through the solution to reduce the chromic oxide, which is afterward precipitated by ammonia hydrate.

It should be said that ammonium hydrate, in addition to the hydrates of this group, precipitates the phosphates of this group and the phosphates, oxalates, borates, and fluorides of the alkaline earths.

The Fifth Group, consisting of tin, arsenic, antimony, gold, and platinum, yield insoluble sulphides when treated with hydrogen sulphide in acid solution. It is true that the succeeding, or sixth, group show the same behavior, but from the latter the fifth group is distinguished by the solubility of its sulphides in ammonium or potassium sulphides or the fixed alkaline hydrates. Tin, the first element of the group, may exist in either the stannous or the stannic state. Stannous salts form purple of Cassius with chloride of gold, reduce mercuric salts to mercurous, and ultimately separate fine gray metallic mercury, form a brownish-black sulphide, not very soluble in alkaline hydrates, but easily in alkaline sulphides, with which it forms double sulphides. From this solution, however, dilute acids precipitate yellow stannic sulphide. Any tin compound heated on charcoal together with sodium carbonate and some potassium cyanide is reduced to the metallic condition.

Antimony is characterized by the following tests: On adding water to the acid solution of its chloride, a white precipitate of oxychloride forms, soluble in tartaric acid. The group reagent precipitates orange-yellow antimony trisulphide. Antimony compounds, placed in an apparatus in which hydrogen is being generated, yield stibine, H_3Sb. If this gas be conducted through a glass tube, narrowed at intervals, and heat be applied to the tube near the narrowed portions, mirror-like deposits of metallic antimony will be formed; the escaping gas, when ignited, burns, and on holding a cold object in the flame a black spot of metallic antimony deposits. This metallic deposit is not soluble in sodium hypochlorite (chlorinated soda), and can in this way be distinguished from the deposit of metallic arsenic. Compounds of antimony heated on charcoal with sodium carbonate and potassium cyanide in the reducing-flame yield a white and brittle globule of metal, while a white coating of antimonious oxide forms on the charcoal.

Arsenic, similarly, forms a hydride, H_3As, which serves for the detection of minute traces of this element (Marsh's test). The metallic mirror or spot gotten in this case, however, is more lustrous than that of antimony, is readily soluble in sodium hypochlorite, and if evaporated with ammonium sulphide leaves a yellowish residue. Arsenic compounds heated on charcoal give off whitish fumes of arsenious oxide, accompanied by a garlic-like odor. The group reagent precipitates from acid solution of *arsenious* compounds yellow trisulphide; from *arsenic* acid solutions sulphur separates, and finally the solution is reduced to the arsenious state, when the yellow trisulphide separates. Silver nitrate precipitates yellow silver arsenite or chocolate-brown silver arsenate, according to the nature of the solution. A dry alkaline acetate heated with arsenious oxide (white arsenic) gives rise to a very disagreeable-smelling compound, alkarsine.

Platinum is recognized by the yellow precipitate gotten in hydrochloric acid solution with potassium or ammonium chlorides. The precipitate in the latter case, when ignited, leaves spongy platinum as the only residue.

Gold salts in solution are precipitated on the addition of ferrous sulphate. Stannous chloride containing some stannic salt produces a purple precipitate (purple of Cassius) even in dilute gold solutions.

The group precipitate, consisting usually of stannic sulphide, antimony sulphide, and arsenic sulphide, may be separated as follows: Treat in a dish with concentrated HCl containing some bromine. Everything except some sulphur will be dissolved. Filter, if necessary, and to cold filtrate add an excess of concentrated sodium hydrate and one-fifth its volume of alcohol, A white flocculent precipitate will indicate antimony. Filter it off, dissolve in HCl, apply some confirmatory test. The filtrate from the antimoniate is boiled, to expel alcohol. Tartaric acid is then added to acid reaction, magnesium chloride, and finally ammonium hydrate to alkaline reaction. Arsenic, if present, will be precipitated as ammonium magnesium arseniate. Filter; acidify with HCl, and add hydrogen sulphide, which will precipitate any tin as yellow sulphide.

The Sixth Group includes mercury, silver, lead, copper, cadmium, and bismuth. A subdivision of this group into two sections is found convenient, as silver, lead, and mercurous chlorides are relatively insoluble in water, and hence are precipitated on acidifying the solution with hydrochloric acid, while mercuric, copper, cadmium, and bismuth salts remain in solution. The sulphides of this group are precipitated by H_2S in acid solution, but differ from the sulphides of the fifth group in being insoluble in alkaline sulphides.

Silver with NaOH precipitates brown oxide; with ammonium hydrate, the same precipitate, soluble in excess of the reagent. Hydrogen sulphide forms black silver sulphide insoluble in dilute acids; hydrochloric acid or chlorides form a white curdy precipitate (AgCl) soluble in ammonium hydrate. Silver compounds heated with sodium carbonate on charcoal before the blowpipe are reduced to metal yielding a white ductile globule. Lead salts with NaOH yield a white hydrate soluble in excess of reagent. Sodium carbonate precipitates a basic carbonate. Hydrochloric acid and chlorides throw down a white curdy precipitate of lead chloride soluble in large quantity of water when heated. H_2S precipitates black-lead sulphide soluble in warm nitric acid. Sulphuric acid produces a white precipitate of lead sulphate readily soluble in a solution of ammonium acetate. Lead compounds heated on charcoal with sodium carbonate yield soft malleable globules of metal, the charcoal at the same time receiving a slight yellow incrustation of lead oxide.

The salts of mercury must be distinguished as mercurous or mercuric. Mercurous salts with sodium hydrate yield black mercurous oxide, while with ammonium hydrate a black mercur-ammonium compound is produced. With H_2S a black sulphide is at once produced, insoluble in nitric acid; with potassium iodide a green iodide is formed; with hydrochloric acid a white curdy precipitate of mercurous chloride (calomel) is formed. Mercuric salts with sodium hydrate yield a reddish-brown precipitate, which becomes yellow if the reagent is added in excess; with ammonium hydrate a white mercur-ammonium compound (white precipitate) is formed. H_2S produces a precipitate turning from white to yellowish, brownish, and with excess of the reagent to black, color. Stannous chloride reduces the mercuric to mercurous salt and then precipitates calomel, an excess of the reagent reducing the latter to metallic mercury. Potassium iodide added to mercuric solutions produces a precipitate of scarlet mercuric iodide. Mercury compounds in general, when heated with sodium carbonate in a narrow glass tube, give a sublimate of metallic mercury. A piece of clean copper immersed in a mercury-salt solution becomes coated with gray mercury, which, rubbed, yields a bright amalgam surface. Bismuth solutions yield with alkalins hydrates a white hydrate insoluble in excess, and with sodium carbonate a basic carbonate. A characteristic reaction for bismuth is the decomposition of its salts by water; this is most sensitive with the chloride, which, poured into water, yields a white precipitate of oxychloride of bismuth. This oxychloride, unlike that of antimony, is not soluble in tartaric acid. Hydrogen sulphide precipitates black sulphide of bismuth. Before the blowpipe bismuth compounds mixed with sodium carbonate yield brittle reddish-white globules of metal. The incrustation of oxide is orange while hot and yellow when cold. Copper salts yield a bluish hydrate with potassium hydrate, turning black on boiling; ammonium hydrate gives a greenish-blue precipitate soluble in excess of the reagent with azure-blue color. Hydrogen sulphide gives a brownish-black precipitate of sulphide soluble in warm nitric acid. A piece of bright metallic iron immersed in copper solutions is rapidly coated with red copper. Copper compounds heated on charcoal with sodium carbonate yield a button of metallic copper. Borax glass is colored by copper compounds, when heated in the oxidizing flame, green while hot, blue when cold. Cadmium salts are precipitated white by sodium or ammonium hydrates; the precipitate in the first case is not soluble, but in the second case is soluble in excess. Hydrogen sulphide precipitates a yellow sulphide soluble in warm nitric acid and in boiling HCl and H_2SO_4, thus distinguishing it from copper. When cadmium compounds are heated with sodium carbonate on charcoal, the latter becomes covered with reddish-brown cadmium oxide. Acids do not admit of the same exact classification as bases, as there are no general group-reagents which serve to distinguish them with much accuracy. For individual tests the reader must consult the manuals of analysis.

Gas Analysis.—In the analysis of gaseous mixtures volumes only can be determined, as the weights of the gases concerned are relatively small, and the experimental difficulties connected with the weighing would be so great as almost certainly to vitiate the results. In measuring the volumes, on the other hand, after allowing for the change in volume due to the varying conditions of temperature and pressure, the measurements can be made with reasonable accuracy. No uniform course of procedure can be laid down for all cases of gas analysis, as the mixtures that arise in practice are of very different character, and the procedure must be based largely upon the physical and chemical properties of the gases concerned. Thus we have to deal with quite a complex mixture in illuminating gas, where hydrogen, carbonous oxide, numerous hydrocarbons, and free nitrogen are all to be determined; with a much simpler mixture of some of these constituents in the gases of the blast-furnace and the Siemens' regenerator and gas-stove; with an entirely different set in the gases of the lead-chamber in the sulphuric-acid process and the gases liberated in the different stages of the alkali process.

In general, the determination of the several constituents in a gaseous mixture is made in one of two ways—either by absorption, with the aid of some reagent introduced into the tube containing the gaseous mixture, or by what is termed "combustion," which may be a slow chemical combination of the combustible gas with oxygen or air, or an instantaneous one brought about by the aid of an electric spark caused to flash through

the tube containing the gas. We shall mention briefly the methods most generally practised, and show how they are applied to the case of the most commonly-occurring mixtures.

The first carefully-elaborated method, and one still in many respects the most perfect, is that of Bunsen, in which the gases are measured in closed tubes over mercury, the absorption reagents are as far as possible used in the solid form, and the combination of the combustible gas with oxygen effected by the passage of the electric spark between platinum wires fused in the upper end of the tubes. Observations of the thermometer and barometer are made with each reading of gaseous volume, in order to apply to the reading of volume the corrections for varying temperature and pressure. These reading are all made through a telescope called a "cathetometer," placed on the opposite side of the room, so that the heat of the body may not affect the confined gas or gases, as it would if the observer came sufficiently close to make the reading with the unaided eye. Fig. 1 shows the arrangement of the apparatus

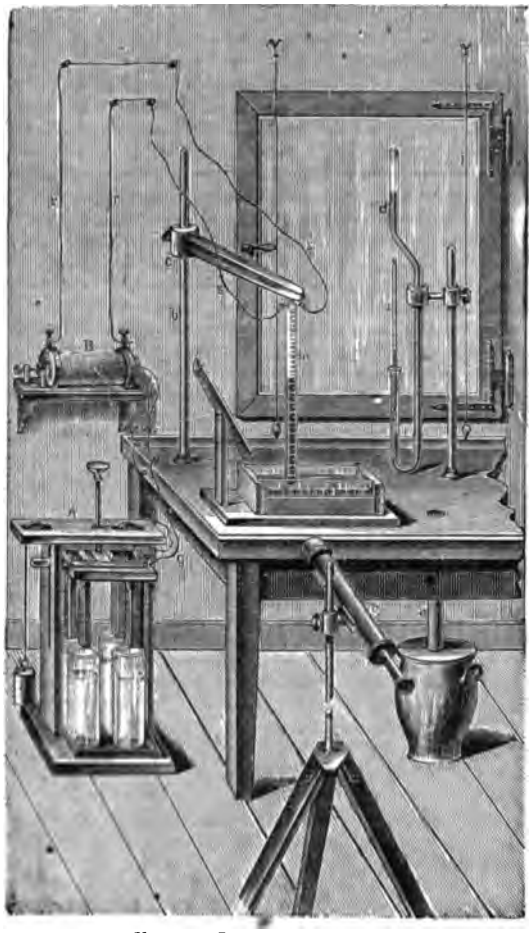


FIG. 1.—Bunsen's Apparatus.

in the case of an analysis by Bunsen's method; *m* is here the eudiometer-tube in which the volume of gas is being measured, the tube being supported firmly in an erect position in a mercury-trough; *d* is a syphon-barometer, and *t* is a thermometer; *ss* represents the wires from an induction-coil, *B*, which are made to terminate in two platinum wires fused in the top of the eudiometer-tube from opposite sides. These platinum wires do not join, but are separated by an interval of a fraction of an inch, through which interval the spark must flash. All the readings are made, as before stated, through the cathetometer, *g*, placed at some distance. The chief objection to Bunsen's method is the great length of time occupied in the absorptions and combustions, as after each handling of the tube some time must be given for the apparatus to take the temperature of the room before a reading can be made that will be accurate. To obviate this difficulty, a number of methods have been proposed, and several introduced into practice, in which the absorption is effected by liquid reagents, which, of course, act much more rapidly as the surface of contact with the gases is much greater; and the residual gas is then measured either at once in the absorption-tube or after transferral to another tube. The first of these liquid-absorption methods was proposed by Doyère, and subsequently improved by Regnault and Reiset, by Frankland and Ward, and by Russell. All these methods involve the use of apparatus made with accuracy, and can be used for exact scientific investigation. Much simpler in construction are what are called "gas-burettes," which serve for the analysis of industrial gases. Apparatus of this kind has been devised by Stammer, Winckler, Raoult, and Bunte. These gas-burettes allow of the absorption of one gaseous constituent of a mixture after another by using successively the appropriate absorption reagent solutions and after each absorption measuring residual gases. The most convenient form of absorption apparatus for the analysis of furnace-gases and all similar mixtures is that of Orsat, which, after several modifications, has assumed the shape shown in fig. 2. In the apparatus figured here the measuring-tube *M*, surrounded by a cold-water mantle, communicates at its lower end with a flask of acidulated water *A*, by the raising or lowering of which the gas is drawn into or expelled from the tube. At the other end it is connected by a capillary tube with a very narrow tube of block tin, which in turn connects by means of the metallic stopcocks *a*, *b*, and *c* with the three absorption-vessels *N*, *P*, and *K*. It also connects by means of a three-way cock *d* with the rubber tubes *S* and *J*. Through the former the gas to be analyzed is drawn into the measuring-tube *M* by lowering the bottle *A*, the stopcocks *a*, *b*, and *c* being closed and the tube *M* full of water; through the latter, by means of the rubber compression-bulb, the connecting tubes are emptied of air, and the absorption-liquid is drawn up to the same level, m', m'', m''', in all three of the absorption-vessels before the gas to be analyzed is drawn in. The absorption-vessels consist of wide tubes filled with fragments of narrower glass tubes, so as to furnish a large surface for absorption, and connecting by a narrow-drawn-out portion with the liquid in the tubulated bottles below. The tubulures of these absorption-vessels and of the flask *A* are of course open during the analysis and closed with corks when not in use. This form of apparatus permits of the absorption of three gaseous constituents one after the other, and the measuring of the residual gas after such absorption.

The method of analysis of a gaseous mixture may now be indicated. With the more complete apparatus of Bunsen (see fig. 1) the analysis of quite complex mixtures may be made. If we take the case of illumina-

ting gas, which contains a number of constituent gases to be determined, we proceed first to the absorptions. A portion of the gas is first measured in the eudiometer over mercury corrections reducing the observed temperature and pressure to 0° C. and 760 mm. respectively, and allowing for the tension of aqueous vapor in the gas being noted. To absorb the carbon dioxide, the first constituent to be removed, a small pellet of fused potassium hydrate cast on the end of a platinum wire is introduced and allowed to remain in the gas for several hours. After its withdrawal, and after the tube has taken the temperature of the room, a reading is made of the residual gas, reckoned as dry, inasmuch as the potassium hydrate has absorbed moisture as well as carbon dioxide. A small coke-ball saturated with fuming sulphuric acid is next introduced, to absorb the olefines or illuminating constituents of the gas. After its withdrawal and the reading of the residual gas, a similar ball soaked with alkaline solution of pyrogallic acid is introduced, to absorb the free oxygen. This is then followed in proper time by the introduction of a coke-ball saturated with an acid solution of cuprous chloride, which absorbs the carbon monoxide. With this absorption the withdrawal of constituents is complete so far as reagents can effect it, and the residual gas, which contains hydrogen, marsh-gas, and nitrogen, is ready for the combustion, which is effected as shown in the cut. Before passing the spark there must be added a quantity of pure oxygen, the volume of which is measured, and of air, which is likewise measured. The oxygen is to unite with the hydrogen to form water, and with the carbon of the marsh-gas to form carbon dioxide; the air is to dilute the explosive mixture and lessen the violence of the combination. After the spark has passed a decided contraction of volume ensues, which, when the temperature has become constant, is measured. This contraction gives the volume of aqueous vapor formed, allowance being made for the tension of aqueous vapor. A fused ball of potassium hydrate is then introduced, to absorb the carbon dioxide, the other product of the combustion. After its absorption and the reading of the residual gas, the only constituent of the original gas remaining is the nitrogen. To determine it, a measured amount of pure hydrogen, sufficient to combine with the oxygen which remains after the previous combustion, is introduced, and then the spark passed again. After this combustion the contraction is read, and then the residue can be only nitrogen and the excess of hydrogen just before introduced. This excess is, of course, known after the reading of the contraction last ensuing; so that the nitrogen of the original mixture is now determined. As before stated, all readings are made through the cathetometer, and all volumes corrected for observed temperature and pressure. The method is accurate, but slow.

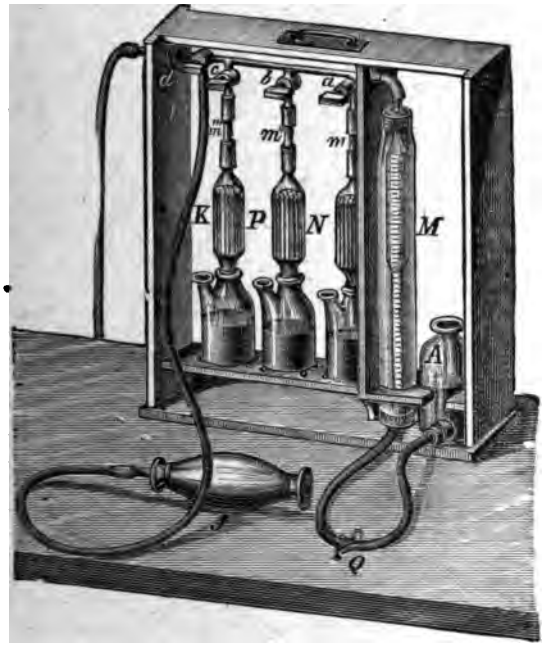


FIG. 2.—Orsat's Apparatus.

In the analysis of furnace or other industrial gases by Orsat's apparatus the case is always much simpler, the gases to be determined being usually carbon dioxide, carbon monoxide, and oxygen. In Orsat's apparatus (fig. 2), by raising the bottle *A* suitably, the water is made to fill the measuring-tube *M* up to a zero-mark on the neck, and then, by exhausting the air with the aid of the compression-bulb *J*, the absorption-liquids are drawn up in the vessels *N*, *P*, and *K* to the marks *m'*, *m''*, *m'''*, when the stopcocks *a*, *b*, and *c* are closed. The tube *S* having been exhausted also by the same means through the three-way cock, *d*, the gas to be analyzed is drawn over into the tube *M* by lowering *A*. The gas having been measured, the cock *a* is opened, and the gas is sent over into *N* by raising *A*. Here the gas is brought into contact with a strong solution of potassium hydrate, which absorbs the carbon dioxide. When this constituent has been absorbed, the gas is drawn back into *M* and measured. The stopcock *a* having now been closed, *b* is opened, and the gas is drawn into the absorption-vessel *P*, where an alkaline pyrogallic-acid solution absorbs the oxygen. After withdrawal and reading, the gas is sent over into *N*, where an ammoniacal solution of cuprous chloride absorbs the carbon monoxide. After this absorption the gas, consisting only of atmospheric nitrogen, is finally measured and the results calculated. Gaseous mixtures of the character just indicated can be analyzed with an accuracy sufficing for technical purposes in perhaps one-tenth of the time required for the execution of the same analysis by Bunsen's method.

For detailed information on these methods of gas-analysis, the reader is referred to *Gasometrische Methoden*, von Robert Bunsen, 2te Auflage (Braunsweig, Friedrich Vieweg und Sohn, 1877), or *Gas Analysis*, by Robert Bunsen, first edition, translated by H. E. Roscoe (Manchester, 1858), and *Anleitung zur Chemischen Untersuchung der Industrie Gase*, von Clemens Winckler (Freiberg, Engelhardtsche Buchhandlung, 1877). (S. P. S.)

CHERBULIEZ, VICTOR, a distinguished French novelist and critic, born at Geneva, in July, 1829, was descended from a Huguenot family driven from its native land by the Revocation of the Edict of Nantes. His father, André Cherbuliez (1795–1874), was professor of Greek and Latin in the academy at Geneva, and published a valuable treatise on *Roman Satire*, an essay on the *Book of Job*, and a dissertation on the orator Aristides of Smyrna, all of which are still of interest to students of ancient literature. Other members of the family were distinguished for their attainments and labors in various departments of literature. Victor pursued his studies at Paris, Bonn, and Berlin,

and was for a time engaged in classical instruction in his native city. On his return from a visit to Greece in 1859 he achieved fame as an art-critic by his work *Un Cheval de Phidias: Causeries athéniennes* (1860). He was engaged as a contributor to the *Revue des Deux Mondes*, and has published in it most of his romances. The first of these was *Le Comte Kostia* (1863), and its success justified the author in adopting this form of literature. Among his other novels are—*Paul Méré* (1864), in which the story is carried on by letters; *Roman d'une Honnête Femme* (1866), the heroine of which has been considered one of the most delicate female characters of modern romance; and *Meta Holdenis* (1873), his greatest work. In this he set forth with wonderful skill an accomplished and charming female hypocrite; and as the story passed through the pages of the *Revue* such interest in her fate was excited that the author received numerous letters beseeching him to save the girl at last. Cherbuliez has since published *Le Fiancé de Mlle. Saint-Maur* (1876), *Samuel Brohl et Cie.* (1877), *L'Idée de Jean Têterol* (1878). While composing these novels he had been engaged constantly as a critic, and in 1873 he gathered a number of his articles under the title *Études de Littérature et d'Art*. His most important political writings are comprised in the two volumes *L'Allemagne politique* (1870) and *L'Espagne politique* (1874), and in contributions to the *Revue des Deux Mondes* under the pseudonym of "G. Valbert." He was naturalized as a Frenchman in 1880, and elected a member of the French Academy Nov. 8, 1881. His public reception took place May 25, 1882, when M. Renan delivered an eloquent speech of welcome.

CHEROKEE INDIANS, a North American tribe usually grouped with the Appalachian tribes, whom they resembled in the degree and kind of their native civilization, and with whom they were associated as neighbors. Their language, however, has few points in common with those of the true Appalachian stock. Gallatin entertained the supposition (derived from the fact that all its syllables end either in a vowel or in a nasal sound) that the Cherokee tongue has a remote affinity with the Iroquois, but this is hardly to be conceded. Two dialects are spoken, and a third is lost. (See the *Cherokee Grammar* of Von Gabelentz.) The Cherokees are to-day the first of the Indian tribes of the United States in intelligence, prosperity, and social and moral progress. This number of Cherokees upon their own reservation in 1890 was 25,357. Besides these, there were reported, on the Eastern Cherokee reservation, in North Carolina, 2885; 1475 males, and 1410 females. Some 19,000 Cherokees in Indian Territory wear citizen's dress, and 16,000, it is said, can speak the English language. There are among them over 60 churches and some 33 missionaries. In 1890 there were 27,176 whites upon the Cherokee reserve. Of the 5,031,351 acres (7861 square miles) of that reserve less than half is tillable, and only 90,000 acres are actually tilled; about 200,000 acres are fenced. The tribe in that year raised 65,000 bushels of wheat, 750,000 of maize, 55,000 of oats and barley, 44,500 of vegetables, 750,000 pounds of cotton, and 12,000 tons of hay. They own 12,000 horses, 1300 mules, 75,000 neat-cattle, 110,000 swine, and 15,000 sheep. Besides the above reserve, there are large areas of "unoccupied Cherokee lands" far to the west and south-west of their present territory. The Cherokee reserve in Jackson, Swain, Cherokee, Graham, and Macon counties, in North Carolina, comprises 65,211 acres, of which some 5000 are tilled. Their only noteworthy crop is that of maize, which is given at 25,000 bushels. A considerable migration of these Indians to the main nation is going on at the expense of the United States government.

See Vol. V. p. 598 Am. ed. (p. 585 Edin. ed.).

The history of the Cherokees since 1540, when De Soto visited them (he called them *Achalaque*, which is a fair presentation of the native pronunciation of their tribal name, is a long and involved one. Their country lay on either side of the Appalachian range, in the upper valley of the Tennessee, and in the Carolinas, extending far south into Georgia and Alabama. In early colonial times they generally adhered to the English, and they made a commendable degree of progress in the arts of peace. Disputes with white settlers led to the bloody war of 1759–63, in which the Cherokees were terribly punished. True to their traditional policy, they assisted the English to some extent during the Revolutionary war, in which they lost much territory to the whites. There was for a long time a division into Western, or hunting, Cherokees, and Eastern, or farming, Indians. A portion of the former went west of the Mississippi in 1790, or earlier, and settled in what is now Arkansas. In 1809, President Jefferson gave his sanction to a plan for removing the remainder of the Western Cherokees, but it was not till 1818 that any large migration took place. Meanwhile, the Eastern Cherokees kept ceding their lands under strong pressure from the whites, treaty after treaty being made by the United States, yet all treaties were alike inoperative. Most of the tribe after 1818 lived in Northern Georgia, upon a comparatively small remnant of their ancient domain. There were two parties among the Indians—the Ridgeites, who were willing to leave the country, and the Rossites, who insisted on some measure of their rights. (These two factions—the former now about two-thirds as numerous as the latter—have continued to exist down to the present.) The country and the politicians generally seemed willing to sustain the claims of the Cherokees, but the State of Georgia, single-handed, set the authority of the United States at defiance, and successfully insisted that the Cherokees must go. The general government yielded; a treaty was executed in 1835 with Major and John Ridge, representing some 600 Cherokees, by which it was agreed that the whole tribe (about 26,000 strong) was to be removed. In 1838 Gen. Winfield Scott was sent to them with a small military force to compel their expatriation. Scott succeeded in effecting his object without bloodshed. After the arrival of the Eastern Cherokees in their new country, the old feud between the Ridge party and the Ross party still continued to distract the tribal councils; but in 1839 the two Ridges and Boudinot were murdered by friends of the Ross party. John Ross became the head-chief, and his party was triumphant. A third faction was composed of those Western Cherokees who wished to live in primitive Indian fashion. This party so far yielded to Ross that in 1837 the hunting Cherokees agreed to form a part of the reunited nation, and since that time they have lost power and numbers; but there are still a few Cherokees who cling to the use of the old costume and the old way of living. During the civil war the Cherokees, being slaveholders, at first took sides with the South, but the majority, under Ross and Downing, their chiefs, finally joined the Unionists; many of the Ridgeites, however, clung to the Confederate cause throughout. In the war of

1861–65 the Cherokee country was devastated, and the people suffered great losses; but the tribe is now more prosperous than ever before. Cattle-breeding is the leading element of material prosperity. In 1890 there were 4242 freedmen among the Cherokees, many of whom claimed citizenship, being, according to the treaty of 1866, entitled to all the rights of native Cherokees; but in point of fact these rights are denied them, although one party among the Indians has strongly asserted the duty of maintaining their treaty obligations.

The Cherokee government is in the main modelled after that of the various States, there being executive, legislative, and judicial departments of the government. The public-school system is good, and there are two large seminaries or advanced boarding-schools, a manual-labor school, and an orphan asylum. The other public institutions are an asylum for the blind, deaf-mutes, and insane, the Capitol building at Tahlequah, the public printing-house, and a jail or prison. The Cherokees have a well-conducted newspaper, printed partly in their own language. Their laws are published in book-form. Manufactures have not been extensively naturalized. Domestic stuffs of several sorts are spun and woven by the women. Lands are not held in severalty, but the acquisition of wealth by individuals is permitted. Most of the expenses of government are paid by the avails of funds in the care of the United States government. Some Delaware and Shawnee Indians and many whites and negroes have been adopted into this tribe, sharing in full the rights and privileges of true Cherokees. The Cherokees are mostly Christianized, and have a translation of the New Testament and parts of the Old into their own language, which they can generally read.

Recently an extensive strip of land in the Indian Territory, lying north of Oklahoma, and extending to the western border of the Territory, which is claimed by the Cherokees, and known as the Cherokee Outlet, has been invaded by white settlers. It had before been used by graziers, but these have been obliged by the U. S. Government to remove their cattle. The validity of the Cherokee claim is questioned, but some amicable settlement is likely to be soon made, and the tract opened to the whites. (C. W. G.)

CHERRY. The cherries of the Old World have found a home in the more temperate regions of the United States. Hundreds of thousands of young trees are raised annually in American nurseries. The seeds are mostly collected from the naturalized trees which abound in many parts of the older States, and which are known as "mazzards." Mahaleb seeds, imported from Europe, the product of the *Cerasus Mahaleb*, are also in extensive use. The plants are set out in nursery-rows when one year old, budded the succeeding summer, and sold when one or two years old from the bud. Many improved varieties have been raised in America, notably by Dr. Kirtland of Cleveland, O., during the middle of the present century, and these, with many of the best varieties of the Old World, comprise the list of kinds grown in American orchards. The best cherry regions are those along the great lakes, and the trees grow well on the Pacific coast. There are few diseases of the cherry, the worst being the "black-knot," produced by a minute fungus. It affects principally the morello class, and is much worse at some times than others. An infected district may again be free for many years. The most troublesome insects are the black aphis and the plum-weevil, which

See Vol. V. p. 509 Am. ed. (p. 586 Edin. ed.).

last deposits its eggs in the fruit, as in the plum, generally inducing rotting before mature. Birds are the worst enemies of the cherry-grower. In the Eastern United States, the cedar-bird, *Ampelis cedrorum*, is so destructive as often to be called the "cherry bird." The cat-bird, *Mimus Caroliniensis*, and the robin, *Turdus migratorius*, eat cherries voraciously when they have a chance, and make no scruple of taking every fruit, if they have the opportunity, as their share for the good they otherwise do in keeping down noxious insects. Large numbers of cherries are divested of stones by machines, and when dried enter largely into commercial account.

The varieties of *C. sylvestris*, the tall, strong-growing species, have been distributed by birds from gardens, and the Cherry is now very common as a wild tree in many parts of the United States, especially in Eastern Pennsylvania. Some of these wild trees are now of immense size. One measured by the writer recently was 9 feet 6 inches round at 4 feet from the ground, and it is believed trees of this size are not uncommon. The timber is excellent, and it is believed that if care were taken to train orchard trees up with tall straight stems the double object of profitable fruit and profitable timber might be secured together. It also makes an excellent fire-wood.

The American species, *Cerasus serotina*, furnishes the best variety for timber purposes. It is a remarkably rapid grower, and generally has a clean, smooth stem 20, or even 30 or 40, feet high. Its usual growth is about 60 feet, though sometimes 80, and trees nine or ten feet in girth are not uncommon. Though a native of most parts of the Atlantic States, it attains its best dimensions in Ohio, Pennsylvania, and Virginia. The timber is very solid, dark red, takes a fine polish, and when judiciously selected compares favorably with mahogany. It is remarkably heavy. When green it takes only 363·7 cubic feet to make a ton of 2000 pounds, just about the same as oak requires. White pine and hemlock take 571·4 feet to make the same weight. If well seasoned before using, posts have been known to remain sound for nearly a quarter of a century, but its great value will always be for elegant furniture. The bark makes the well-known "wild-cherry tonic," and an infusion of the berries with brandy and some sugar makes "wild-cherry bitters." It is not found west of the Mississippi, though when under culture it thrives well even on the Pacific coast. Its distinctive names are "Wild Black Cherry" and "Choke Cherry." The dwarf Choke Cherry, *Cerasus Virginiana*, seldom growing more than ten or fifteen feet high, is of no known use in the arts. It has interest to cultivators as being the species which probably introduced the black-knot. These two are replaced at the Rocky Mountains and westward to the Pacific by another dwarf species, *Cerasus demissa*, the berries of which form a popular Indian food. They are dried in the sun, then mixed with meat, which is then pounded to a jelly, dried, and used for a sort of broth. They also make a tea of the bark, probably for medicinal uses. The Indians of the Indian Territory also use the fruit of the Sand Cherry, *Cerasus pumila*, in a similar way. At the season when the fruit is ripe, old and young turn out for a general cherry-gathering. The Sand Cherry has shining, willowy leaves, and seldom grows higher than five or six feet. In the Southern United States there is an evergreen species, *Cerasus Caroliniensis*, known as "Cherry Laurel," "Wild Orange," and "Almond Cherry." It is popular as an

ornamental tree, but of no commercial value. In this it resembles the Cherry tree of Eastern Asia. In the poetry of China and Japan cherry-blossoms play a prominent part; but Japanese visitors to the United States find it hard to convince their countrymen that in America Cherries are accounted a delicious fruit.

The Cherry which most nearly approaches the Cherry of the Old World is the "Wild Red Cherry," *Cerasus Pennsylvanica*. The small red fruit is borne in bunches, much as the cultivated kinds are. The smooth bark is also of a reddish-brown tint, so that its name is wholly appropriate. It inhabits chiefly the Northern United States, extending westward to the Mackenzie River. The fruit is used for culinary purposes, but is small and harsh. The tree is too small to have much value in forestry. Specimens in Northern Pennsylvania are found from 25 to 30 feet high. It springs up often in vast quantities after mountain-fires. Some of the hills in the vicinity of Mount Washington that have been burned over now have dense growths almost wholly of this small Cherry. (T. M.)

CHESAPEAKE BAY is a large land-locked arm of the Atlantic Ocean included within the States of Maryland and Virginia. It was first explored, in great part, by Capt. John Smith, one of the band of adventurers on board the ships under the command of Capt. Christopher Newport, who entered the bay in the year 1607, commissioned by the London Company, under whose auspices this the first permanent settlement of the English race on this continent was made. The name Chesapeake seems to have been derived from that of a tribe of Indians or from their abode near Elizabeth River, at the south end of the bay. Its general direction in length is north and south, the entrance between Cape Charles and Cape Henry (lat. 37° N.), and the upper extremity, at the mouth of the Susquehanna River (lat. 39° 35′ N.), being both nearly on the meridian of 76° W. long. The length by the main channel is about 200 miles. The lower half of the bay follows a meridional line, varying in width from about 11 miles (15 miles at the entrance) to a maximum of 20 miles, while the upper half bends in a gentle curve, 20 miles at most, convex to the westward, the width diminishing northwardly from about 10 to 3 miles.

The bay is set among tertiary and alluvial formations, and hence the shores are flat and in some places swampy, and much indented by small bays or coves, particularly on the eastern shore, the largest of which are known as Tangier Sound and Pocomoke Sound. The western shore receives several large rivers whose general course is from the north-west. The more important of these rivers, reckoning northward, are the James (with its southern affluents, Elizabeth River and the Nansemond), the York, Rappahannock, Potomac, Patuxent, Severn, and Patapsco rivers. The Susquehanna River comes in from the north at the head of the bay, and to this succeed, on the eastern shore, the North-East River, the Elk, Sassafras, Chester, Choptank, Nanticoke, and Pocomoke rivers. There are several groups of small islands in the bay on the eastern side, the principal of which are Tangier, Smith's, and (the largest of all) Kent Island.

The main channel of Chesapeake Bay is accessible to the largest sea-going vessels, and every part is well lighted and buoyed. Around its shores are several seaports—Norfolk, with its United States Navy-Yard, on Elizabeth River, at the outlet of the Dismal Swamp Canal and the Albemarle and Chesapeake Canal; Newport News, recently established and rising into importance, at the mouth of the James River, near Old Point Comfort, the site of Fortress Monroe, and adjacent to Hampton Roads; and, farther up the bay, the large city of Baltimore. All these are the termini of great railroad systems from the interior. Besides these two canals, there is the Chesapeake and Delaware Canal, built many years ago eastward from the upper part of the bay, and another, of larger capacity, is now proposed in the same direction.

Immense draughts of fish are taken along the shores of this great bay and from its tributary rivers, of which the principal may be named: From salt water, the bluefish, Spanish mackerel, mullet, gray trout, spotted (or salmon) trout, sheepshead, sea-bass, and whiting; and from the rivers, the herring (more properly known as the alewife), shad, sturgeon, black and striped bass, perch, and catfish. Some of these fish are found in both salt and fresh water. Large quantities of menhaden are captured, and used for the production of oil and fertilizers. The oysters of Chesapeake Bay are world-famous, and, while supplying the markets of the neighboring cities, form also an important consignment to the interior and to foreign countries, affording employment to large numbers of persons in their take, canning, and carriage. Among other products of these waters are clams and crabs and the terrapin, a species of tortoise, a notable delicacy of the Maryland *cuisine*. Nor should be forgotten the flocks of various species of wild-fowls which congregate here in countless myriads during the winter; among these is the canvas-back duck, so esteemed for its delicate flavor, acquired by feeding on the wild-celery found here in abundance.

The proper regulation of the fisheries is carefully looked after by commissioners on the part of Maryland and Virginia, in co-operation with the United States commissioner of fish and fisheries, who also give much attention to the artificial propagation as well as to the distribution of the eggs and live fish for transplanting in other waters. The importance of these fisheries is shown by the following abstract, made up from the reports of these commissioners furnished for the United States census of 1880: Number of persons employed, 44,872 (of these, 11,064 are factory-hands engaged in the packing, etc.); number of fishing-vessels 2896, and boats 9443; value of capital employed in fishing-vessels and boats, apparatus, and factories, $8,256,562; value (to fishermen) of the product of fish (including oysters), $8,346,159. But this, the first value, is estimated to be enhanced from two to three fold before reaching the consumer. Of this latter item, $5,221,715 are contributed by Maryland, and $3,124,444 by Virginia. The estimate of the quantity of oysters taken during the census year is, for Maryland, 10,600,000 bushels; for Virginia, 6,837,320 bushels.

(W. L. N.)

CHESS, CHEAT, in botany *Bromus secalinus*, or the rye-like brome grass. It is a native of Europe, but was early introduced into America with agricultural seeds from the Old World, and under the name of Chess or Cheat, has become one of the most noted weeds in American agriculture. It is a very common weed among the crops of wheat and rye in the west of England, where it is called *drank*, according to Withering, though *drake* is also given as one of the common names of the darnel, *Lolium temulentum*, by other authors. The last named is believed to be the "tares" mentioned in Matthew xiii., though some have suspected the plant we call "Chess" may have been in-

tended, or indeed any other bad weed appearing among wheat. Webster notes that in searching for the derivation of the word *chess*, we have to compare it with the Persian word *khas*, which means any bad weed. The name as applied to this plant does not appear to be in common use in England, though the transmutative belief with which the plant is connected here had its origin in the Old World. The popular English idea is that grain has all been derived from some original type. Wheat, for instance, changes to rye, rye to barley, barley to brome grass, and brome grass to oats. In America the prevalent belief is that wheat changes directly to Chess or Cheat; and the belief is so widespread that even intelligent pens are yet often employed in the advocacy of the supposed change. The belief that one form of plant may be evolved or may spring from another parent form is widely held by naturalists of the present day; but the laws of morphology are now so well understood that, whatever an evolutionist might be willing to concede any given variety of wheat might turn to, he would pronounce such a change as from wheat to Chess an impossibility. The belief in the transmutation seems to arise from the fact that chess-seed is almost always in company with wheat, or is in the soil from former seedings, ready to spring into vigorous growth whenever circumstances favor. Sometimes wheat is winter-killed, and the Chess, having sole possession of the ground, grows so vigorously as to seem like the crop originally sown. Only for its interference with the wheat crop it has some agricultural value. It has been grown as green feed, and found to be preferred to green oats by horses. It makes excellent hay. Many years ago it was introduced into the United States under the name of "Willard's Grass" as a variety of great value, and very high prices paid for the seed until it was discovered to be the veritable Chess already wild here. The seeds are said to have the same effect as darnel when ground up with wheat as flour for bread; that is, they give it bitterness and a narcotic effect. There is, however, reason to believe, from some recent experiments in Scotland, which seem to have been carefully made, that there is no ground for this reputation in darnel, and probably none for Chess either. Chess is an annual plant, and very easily eradicated by keeping the ground infested by it under hoed crops for two years. (T. M.)

CHESTER, the county-seat of Randolph co., Ill., is on the Mississippi River, at the mouth of the Kaskaskia, 80 miles below St. Louis, and is the terminus of the Wabash, Chester, and Western Railroad. It is lighted with electric light, has six hotels, a bank, two weekly newspapers, seven churches, and three schools. There are also two flour-mills, two grain-elevators, an iron-foundry and machine-shop, and manufactures of barrels and soda. The Southern Illinois penitentiary is in the city, and the convicts are employed in boot- and shoe-making. Chester was settled in 1832, and incorporated as a city in 1855. Its property is valued at $1,800,000, though assessed at less than one-third of this amount. Its public debt is $66,400, and its expenses for the year ending April, 1882, were $11,500. The site is elevated and the surrounding country picturesque. There are coal-fields and iron-mines in the vicinity. One-half of the inhabitants are of German birth. Population, 2710.

CHESTER, JOSEPH LEMUEL, LL.D., D. C. L. (1821–1882), an American author and antiquary, was born at Norwich, Conn., April 30, 1821. After residence for some years in Philadelphia, he went to London in 1858 as an agent for the manufacturers of the Snider rifle. Henceforth his residence was in London, and he contributed to both American and English periodicals. Having long supposed himself to be a descendant of John Rogers, the first martyr of the English Reformation, he entered upon an extensive investigation of original records, which, to his disappointment, proved this claim unfounded. But he availed himself of his researches to publish the first complete biography of Rogers and his family. He also investigated in the same way the genealogy of Washington, and disproved some mythical statements on the subject, though failing to obtain a satisfactory account. Having now devoted himself to antiquarian pursuits, he procured a written copy of the parish register of every church in England, and carefully indexed the whole. In his researches at Westminster Abbey he was cordially assisted by Dean Stanley, and in 1876 he published *The Marriage, Baptism, and Burial Registers of the Collegiate Church or Abbey of St. Peter, Westminster*, which was dedicated to Queen Victoria. The remarkable merits of this laborious work have been acknowledged by the highest authorities in English history and biography. Col. Chester was one of the founders of the Harleian Society in 1869, and was a member of several historical societies. He was honored with the degree of LL.D. from Columbia College, and in 1881 received the degree of D. C. L. from the University of Oxford. He died in London, May 26, 1882. He was a man of fine personal appearance, a fluent and pleasing writer, and as an antiquary accurate and indefatigable. His established reputation for fidelity procured for him access to family records guarded with scrupulous care. He was an expert in the handwriting of the past six centuries, but unfortunately much of his investigation has not been given to the world. Among his early publications were *Greenwood Cemetery, and Other Poems* (1843), and a *Treatise on the Law of Repulsion* (1853). In London he published *John Rogers, the Compiler of the First Authorized English Bible, the Pioneer of the English Reformation,, with his Writings and a Genealogy of his Family* (1861). Besides the *Registers of Westminster Abbey*, he edited several valuable records for the Harleian Society.

CHESTER, a city of Pennsylvania, on the west bank of the Delaware River, at the mouth of Chester creek, 10 miles south-west of Philadelphia. It is on the Philadelphia, Wilmington, and Baltimore Railroad, and on the Philadelphia and Chester branch of the Reading Railroad. From the southern suburb of Lamokin a branch railroad extends to the westward. Chester was settled in 1643 by the Swedes, who called it Upland; and this was doubtless the first European settlement within the present limits of Pennsylvania. It is now an important manufacturing centre. Its industries include cotton goods, printing, dyeing, oil-refining, and the production of castings, steel, machinery, brass goods, edge-tools, pipes, tubes, yarns, cotton and woollen jeans, cassimeres, dyes, oil-cloths, doors, window-sash, bricks, pottery, carriages, drain-tiles, belting, shoes, morocco, etc. One of its shipyards for the construction of iron vessels has a world-wide reputation. Chester became a city in 1866. It has one private and two national banks, two daily and four weekly newspapers, a system of graded public schools (including high schools), and a military academy

of high grade. Near the city is the Crozer Theological Seminary (Baptist). The population in 1890 was 20,167.

CHESTERTOWN, the county-seat of Kent co., Md., is on the W. bank of the navigable Chester River, 3 miles from its entrance into Chesapeake Bay and 30 miles directly E. of Baltimore, with which it has daily communication by steamer. It is the terminus of the Kent County Railroad. It has a court-house, national bank, two weekly newspapers, and six churches, and is the seat of Washington College, founded in 1782. It is surrounded by a peach- and grain-growing country, and has manufactories of carriages, agricultural implements, straw-paper board, and artificial fertilizers. It is one of the oldest towns in Maryland, and in colonial times carried on a large trade with England. Population, 2640.

CHESTNUT. The Chestnut is believed to be only naturalized in Europe, and that it was gradually introduced or spread by degrees from Asia Minor, through Greece, to Italy, and from thence over Europe. There appears to have been large forests of Chestnuts in Italy during the time of the Roman emperors. It is believed that the Latin name, *Castanea*, is derived from Castanum, an ancient town in Thessaly. It exists in Japan, and during the American Centennial Exposition a collection of Japanese woods was on exhibition, among them Chestnut-wood under the native name of "Kuri." The Japanese form, the American form, and the form now known in Europe are all very closely allied, and, though in some works known as *Castanea Japonica*, *C. Americana*, and *C. vesca* respectively, are all united by Alph. de Candolle under the name of *Castanea vulgaris*, or "Common Chestnut." Some authors, however, contend for the indigenous character of the Chestnut in Europe, but the well-known comparisons between the flora of the Atlantic United States and the flora of Japan, and the greater resemblance of the European to the Japanese rather than to the American form, favor the idea that the latter is an Asiatic immigrant since the time when the peculiar characteristics of the American were formed. The chief of these characteristics is the smaller size of the leaf-buds, leaves, and fruit in the American species, though the trees themselves under equally favorable circumstances grow nearly as large. In Europe some enormous specimens have been recorded, though the figures concerning them vary. For instance, there is, or was recently, a large one on Mount Etna, which is given as 160 feet, 190 feet, and 204 feet round by three several authorities. Trees of 50 feet in circumference have often been recorded in Europe; 20 to 30 feet are common measurements there, and are not unusual in America wherever the trees grow by themselves in fairly good soil. The height is from 70 to 80 feet, though some have been known to reach 100. They are supposed to be long-lived, and this is unquestionable as regards European trees; but in America the writer knows of numbers of very large specimens, certainly about 100 years old, that are beginning to decay; and this may be taken as the average age of the tree. It is found throughout the whole of the Atlantic portion of the United States east of the Mississippi River, except the extreme north-eastern portion, reaching elevations of over 2000 feet. Naturally, it seems to thrive best in the hilly regions. In low lands it is sometimes found very vigorous, though attempts at culture on the prairies have not been very successful. In the hilly districts it often suffers in very dry seasons. The injury does not show till the following year, when large, chiefly the uppermost, branches either die or grow in a sickly manner. This has often given rise to the impression reported in American works on forestry that the tree is unaccountably dying out in some locations. But young trees soon come up to replace the older ones injured by the drouth.

See Vol. V. p. 528 Am. ed. (p. 608 Edin. ed.).

It is one of the most useful trees in American forests. For railroad purposes it is not used where oak can be freely obtained; but Professor Augur reports that it is used in Connecticut for railroad ties, and very acceptably. It is the great fence-timber of the United States. Chestnut posts and rails bring higher prices than those from any other tree. Chestnut shingles for roofing, and Chestnut barrels for flour and other dry materials, are also popular. It is not good fuel, the dry wood having only a heating capacity of ·53, as against 1·00 for hickory. It weighs about 41 pounds to the cubic foot when well seasoned. Though this indicates light wood, it seems to want the power to absorb moisture when well seasoned, and this gives it its great value for posts, which generally last 30 or 40 years. It is employed to a considerable extent in shipbuilding, being used for frames and for the upper works of steamers and coasting vessels.

The Chestnut is also highly esteemed for its nuts. In Europe the fruit is larger than that borne by the American form, and, when boiled, enters largely into the food of the poorer classes in Spain and adjacent countries. The American Chestnut is rarely more than half the size of the European, but is sweeter and is eaten freely as gathered from the tree. The nuts are often attacked by the chestnut weevil, the larva of which feeds on the kernel in the form of a small white maggot or "worm," which soon after the fruit is ripe eats its way out and finishes its transformation in the ground. Dr. Packard, however, believes that a few remain in the nuts till spring. The weevil is known to entomologists as *Balaninus caryatryphes*. A small-growing species, *Castanea pumila*, is known as Chinquepin, and is found in poor soils on mountain-slopes throughout the whole Alleghany range. It usually grows from 6 to 12 feet high, but occasional specimens have been known to reach 40 feet and a circumference of 3 feet.

The California Chestnut is not a true *Castanea*, but is known as *Castanopsis chrysophylla*. Sometimes it is not more than 2 or 3 feet high, but occasionally rises to 60 or 70 feet. (T. M.)

CHEVALIER, MICHEL (1806–1879), a French political economist, was born at Limoges, Jan. 13, 1806. He was the eldest son of a merchant, and was admitted at the age of eighteen to the Polytechnic School, his course in which was followed by one in the School of Mines. He became imbued with the doctrines of St. Simonianism, and published in the *Organisateur* several articles on this subject, which attracted attention. He afterwards became editor of the *Globe*, a journal just acquired by the sect as the organ of their peculiar views. He conducted this journal for two years, but a division taking place between the leaders of the sect, he followed M. Enfantin to Ménilmontant, where a sort of monastic community was founded, M. Enfantin being the abbot or *père suprême*, and Chevalier one of the *cardinals*. But the Government soon put an end to the eccentricities of this new Church, and Chevalier, as editor of the *Globe*, was condemned to a year's imprisonment (July, 1832). After the expiration of his term of sentence, which the Government had reduced one-half, he retracted in the *Globe*

all that he had written against the Christian religion, and was sent by M. Thiers on a special mission to the United States in 1832 to study the American system of water and railway communication. He gave two years to this purpose, travelling over the United States, Mexico, and Cuba, and published in the *Journal des Débats* a series of letters which attracted great attention. These letters were afterwards amplified and published in a separate work, entitled *Lettres sur l' Amérique du Nord* (2 vols., 1836; 3d ed. 1838). Humboldt considered this brilliant work as "a treatise on the civilization of the Western peoples." It was followed in 1838 by a work received with equal favor, *Des Intérêts Matériels en France*, etc., a brilliant sketch of the internal improvements planned by M. Mole. He became master of requests and councillor of state (1838), a member of the superior council of commerce and professor of political economy in the College of France (1840), and chief engineer of mines (1841). His lectures at the College of France were very popular, and he continued his contributions to the *Journal des Débats*, in which he sustained conservative views. He was elected to the Chamber of Deputies in 1845, but failed to obtain a re-election in 1846 in consequence of his views concerning free trade, of which he had now become an ardent advocate. He earnestly but vainly sought in 1847, with F. Bastiat, to organize in France a reform league on the basis of the Anti-Corn-Law League which had just triumphed in England. After the Revolution of 1848 he vigorously opposed the doctrines of Louis Blanc in papers published in the *Revue des Deux-Mondes*, entitled *Question des Travailleurs*, comple mented in the *Débats* by *Lettres sur l' Organization du Travail*. On account of the anti-revolutionary sympathies which he displayed in this contest he was dismissed from his chair at the College of France, but was reinstated before the end of the year. In 1851 he was elected a member of the Academy of Moral and Political Sciences, and in 1852 his sympathy with the *coup d'état* of Napoleon brought him the nomination of councillor of state. He was made a member of the commission to organize the French Exposition of 1855. He continued vigorously to advocate his free-trade views, and was in 1860 one of the promoters of the treaty of commerce between France and England, which he aided Cobden in negotiating. In the same year he was made a member of the Senate, where he took part in several important discussions on financial and industrial questions. In 1862 he was elected president of the French section of the international jury on prizes at the second London World's Fair. In the second French Exposition of 1867 the publication of the official report was entrusted to him, and he prepared an *Introduction aux Rapports du Jury international*, in which the whole subject of modern industry was philosophically treated. This was published in separate form in 1868, in which year he was made a member of the committee to investigate the state of agriculture. He was frequently a member of the imperial council of public instruction. He was made grand officer of the Legion of Honor in 1861, and has received a great number of foreign orders. After a journey to England the prince of Wales sent him the medal created by Prince Albert for promoters of industrial and commercial progress (1875). He died Nov. 29, 1879.

In addition to the works mentioned he published *[illegible]ire et Description des Voies de Communication [illegible] Unis* (2 vols., with folio chart, 1840), which [illegible] the American railroads of that time with reference to their influence on social intercourse; *Cours d'Économie politique* (3 vols., 1842–50); *Essais de Politique industrielle* (1843); *L' Isthme de Panama*, etc. (1844); *La Liberté aux États-Unis* (1849); *Examen au Système protecteur* (1851); *Questions politiques et sociales* (1852); *La Question de l' Or* (1853); *De la Saisse probable de l' Or* (1859); *L' Expédition du Mexique* (1862); *Le Mexique ancien et moderne* (1863); *Le Monopole et la Liberte* (1867); *Comment une Nation retablit sa Prospérite* (1871); *Des Moyens pour un État de refaire ses Finances* (1875), etc.

CHEVERUS, Jean Louis Anne Madeleine Lefebvre de (1768–1836), first Roman Catholic bishop of Boston, French prelate and cardinal, was born at Mayenne, France, Jan. 28, 1768. When a boy he devoted himself to the Church, receiving the tonsure at the age of twelve. He was appointed prior of Torbechet with a revenue that enabled him to pursue his studies with ease, but afterwards, on account of a lawsuit, he resigned. He was made a deacon in October, 1790, and ordained Dec. 8 in the same year, this being the last ordination in Paris before the Revolution. He assisted his uncle, the curate of Mayenne, and was afterwards appointed to succeed him. Meantime, he had refused to take the oath required by the French Assembly, but was able for a time to exercise his ministry in his own house. At last he was driven out and imprisoned in Paris, but escaped in June, 1792, and fled to England. Here he speedily acquired the language, and began to teach French and mathematics in a school. Within a year he had gathered a congregation in London, with the approval of the bishop, and preached in English. On account of his zeal he was appointed by the bishop of Dol his grand vicar, and at the same time his friend, Abbé Matignon, having gone to Boston, invited him to assist in introducing Catholicism. He arrived there April 3, 1796, charmed the people with his manners and overcame their prejudices. He soon began to preach with such simplicity, earnestness, and eloquence, that crowds were attracted to hear him. Archbishop Carroll invited him to take charge of St. Mary's Church at Philadelphia, but his love for his friend prevented. He spent three months in visiting the Indian tribes in Maine, but was recalled to Boston, where the yellow fever was raging with violence. The courage, benevolence, and faithfulness which he displayed in ministering to the sick and dying, without regard to sect or creed, endeared him to all classes of people. Channing confessed that no minister in the city would care to challenge a comparison between himself and Father Cheverus. When a public dinner was given to President Adams on his visit to Boston, the two highest seats were reserved for the President and the priest. When the legislature of Massachusetts revised the oath to be taken by citizens, the form prepared by Father Cheverus was adopted. When he began to collect subscriptions to build a Roman Catholic church, President Adams headed the list, and Protestants subscribed freely. The Church of the Holy Cross, thus erected, was consecrated Sept. 29, 1803. Meantime, Catholicism having been restored to France, he was entreated to return, but resolved to share the lot of his little flock. He was highly honored by Protestants, and his advice eagerly sought on important matters. His tact and humor, as well as his greater qualities, proved valuable in his peculiar position in a Puritan community. He was one of the founders of the Boston Athenæum, and was engaged in other works of general utility. In 1810 four

new dioceses were formed in the United States, and Father Cheverus was consecrated bishop of Boston by Archbishop Carroll, at Baltimore, Nov. 1, 1810. He continued with unabated zeal to carry on the work in which he had been engaged. He preached several times in churches of other denominations, and held public controversies on Catholic doctrines and practice. He was active in promoting education, and established the Ursuline convent at Boston for young ladies. When his friend, Father Matignon, died, Bishop Cheverus with his clergy went in solemn funeral procession through the streets. At last his incessant labors and the severity of the climate began to tell upon his health. His physicians advised him to return to his native land, and King Louis XVIII. invited him to become bishop of Montauban. He left Boston as poor as when he entered it, having bestowed all his possessions on his friends, the clergy, and the poor. Escorted by 300 carriages, he set out for New York, where he embarked Oct. 1, 1823. At Montauban he devoted all his energies to his diocese, but his reputation spread all over France. In 1826, when a disastrous freshet swept through the valley, he took 300 destitute people into his palace. In the same year he was appointed bishop of Bordeaux, being consecrated in November. In his new diocese he established many religious institutions, especially one for the relief of aged and infirm priests, promoted uniformity in the ritual, secured able and efficient pastors for the people. Being now a peer of France, he went at times to Paris, where he was often consulted by King Charles X. with reference to religious liberty. When the Revolution of 1830 took place, Bishop Cheverus assisted in maintaining public order, but declined to attend the Chamber of Peers. During the prevalence of the cholera he opened a hospital in his palace and placed over the door the inscription, "Maison de Sécours." At the request of King Louis Philippe, and with the approval of all classes, he was proclaimed cardinal by Pope Pius VII. on Feb. 1, 1836. He had had a stroke of apoplexy in 1834, and his unremitting activity hastened his death, which took place at Bordeaux, July 19, 1836.

CHEVES, Langdon (1776–1857), an American statesman, born at Rocky River, S. C., Sept. 17, 1776. After service in the legislature, and acting for a short time as attorney-general, he was elected to Congress in 1811, and zealously supported the declaration of war against Great Britain. In 1812 he was chairman of the committee on the navy, and in 1813 of that on ways and means. In 1814 he succeeded Henry Clay as speaker of the House, and in 1815 the bill for the recharter of the United States Bank was lost by his vote in opposition. But in 1819, the directors of the bank, having succeeded in obtaining a new charter in 1816, and wishing to increase its favor with the public, elected him president. In order to maintain specie payments he greatly contracted the bank circulation, and thus produced temporary distress in the country. In 1822 he was made chief commissioner to carry out the provisions of the Treaty of Ghent, after which service he held no public office. He was an early advocate of a Southern confederacy, but in 1832 he opposed the nullification movement in South Carolina as inexpedient. In 1850 he was a delegate to the Nashville Commercial Convention, but in 1852, in the South Carolina Convention, he opposed secession by that State alone. He died at Columbia, S. C., June 25, 1857. His only publications were essays and reviews, among which those on the United States Bank were the most noted.

CHEVREUL, Michel Eugène (1786–1889), a French chemist, noted also as a centenarian, was born at Angers, Aug. 31, 1786. His father, a physician and professor in the University of Angers, died at the age of 91, and his mother at the age of 93. Eugène in 1803 entered a laboratory at Paris, and in three years had entire charge of it. In 1813 he was made professor of chemistry in the Lycée Charlemagne, and began his investigation in regard to oils and fats. These labors had direct effect on the industrial applications of chemistry, opening the way for artificial preparation of substances, previously restricted to natural methods. In 1824 he became chemical director of the Gobelins factory, and soon discovered the law of harmony and contrast of colors. He held this position till his death, on April 9, 1889. He was also professor in the Museum of Natural History from 1830 to 1883, and occupied his residence here during the siege of Paris in 1870. From 1806 until 1888 he published a long series of valuable scientific papers, and many works on chemistry. The hundredth anniversary of his birth was publicly celebrated in 1886, and congratulations were presented to him from all parts of the world. He was a strict abstainer from tobacco and alcoholic liquors. His son Henri, born in 1820, died a month before him.

CHEYENNE, the capital of Wyoming and county-seat of Laramie co., is on the eastern slope of the Laramie Mountains. It is 106 miles N. of Denver and 516 miles W. of Omaha. The Union Pacific Railway passes through the city, and here joins the Denver Pacific, Colorado Central and the Cheyenne and Northern Railroads. The city has a handsome state capitol, a fine city-hall, a court-house, an opera-house, a school-house, and a county hospital. It has hotels, banks, daily newspapers, and several churches. A school of mines has been established. The principal industrial works are the machine-shops of the Union Pacific Railroad; there are also manufactures of saddles, wagons, carriages, sashes, doors, etc. Cheyenne was settled in 1867 and incorporated in 1869. It has gas and electric light, good sewerage, and water-supply from Crow Creek.

It is the headquarters of extensive cattle-raising interests, and carries on a large trade. Near the city coal and iron are found, and twenty miles out, there are silver and copper-mines. Fort Russell is within two miles. Population, 12,471.

CHEYENNES, a tribe of American Indians, by most authorities classed with the Algonkin tribes. They seem to have been driven from the vicinity of the Red River of the North by invading Sioux. Retreating beyond the Missouri, they first became known to the whites in 1803, when the exploring expedition of Lewis and Clarke found them situated on the Cheyenne River near the Black Hills. They are tall in stature, fine horsemen, and of warlike habits. Their relations with neighboring tribes have usually been hostile.

By the first treaty made with the Cheyennes in 1825, no limit was fixed to their range of free movement. They were then at war with several surrounding tribes. The next important point in their history was a division of the tribe into two sections. One of these remained on their old hunting-grounds, and aided the Sioux in a war with the Crows, who were driven westward from their original seat. The other section migrated to the region of the Arkansas River, where they joined the Arapahoes, with whom they have been since in close alliance. In 1847 their num-

bers were estimated at 5300. In 1851 a new treaty was made with them, and several others have been made since, each conflicting with the terms of the others, and each but half comprehended by the Indians, while the Government has failed to observe or enforce its own obligations under these treaties. In consequence of this diversity and confusion of requirements and lack of good faith much distrust arose in the Indian mind, and many serious troubles followed. The treaty of 1861, whose provisions remained a dead letter, deepened the hostile irritation of the Cheyennes, but the first outbreak took place in April, 1864, brought about by an inconsiderate movement of United States troops. A ranchman named Ripley complained that some of his stock had been stolen by Indians. The officers, to whom he was unknown, demanded no proof of his story, but at once set out with troops, and attempted to disarm a party of Cheyennes, some of whose horses the ranchman claimed as his. This effort was resisted, and a fight ensued. In the following month a body of Colorado troops attacked and burned a Cheyenne village, killing 26 and wounding 30 of its inhabitants. After further troubles the chiefs applied for peace, declaring that the war had been forced upon them. During the negotiations for the settlement of the difficulty the neighboring Indians were ordered to move nearer the fort, that they might be protected. They complied to the number of 500, forming their camp at Sand Creek in the vicinity of Fort Lyons. While they were thus situated their camp was suddenly surrounded by a body of Colorado soldiery under Col. Chivington, who commenced a ruthless assault which soon became a remorseless massacre. Women, fleeing or praying for mercy, were brutally shot down; children were killed and derisively scalped; men were tortured and mutilated; in all, more than 100 were slain. This unprovoked massacre, which no action of the whites in the whole history of Indian wars has surpassed in brutality, had its natural consequences. The Cheyennes flew to arms. A fierce war ensued which cost the Government $30,000,000; 15 or 20 Indians were killed, while hundreds of soldiers were killed, many settlers butchered, and much property destroyed. It was finally ended by a treaty, which was followed by another treaty in 1867 inconsistent with the first. Then in 1867 a report of some excesses by the Cheyennes came to Gen. Hancock. He immediately advanced with a strong force against a large village of the Dog-Soldier band of the Cheyennes. The chiefs tried to induce him to pause in his advance, but when he persisted the men, women, and children fled from the village, so that on reaching it he found it deserted. He immediately burned the village with all the property of the tribe which it contained. Then the Indians, outlawed and forced to war, waged it determinedly. Many soldiers and settlers were killed, valuable trains captured, stations destroyed, hundreds of horses and mules taken, while the entire loss to the Cheyennes after the burning of their village is said by the Indian commissioner to have been only six men killed. In 1868 another difficulty arose, which seems to have originated in injudicious action on the part of the Government. The peace commissioners had made a treaty with the Cheyennes and Arapahoes, in which they agreed to surrender the reservation given them by treaty in 1865 and accept a new reservation. It was stipulated that no whites should settle on their old reservation within three years from October, 1867. Unwise delays occurred in carrying out the provisions of this treaty. Whites intruded on the old reservation, and no effort was made to check them. The annuities of the Indians were needlessly delayed, and they were left destitute and half starving. They were practically left landless, except their right to hunting-grounds south of the Arkansas. The nomadic tendencies of the Indians were intensified by this treatment. Some troubles followed, and it was decided that they were hostile and must be punished. No allowance was made for the fact that partial starvation, through bad treatment, had caused such excesses as they had committed, and that these might have been hindered and new ones prevented more easily and cheaply by justice than by the sword. A winter campaign and a severe blow upon the Cheyennes was determined on. Gen. Custer led the assailing-party through the snows of a Western winter, surprised the camp of the chief Black Kettle on the Washita, killed 103 warriors, and took their women and children prisoners. The southern Cheyennes are now established on their reservation in the Indian Territory, the Government having finally succeeded in fixing its location and limits. The Arapahoes are now largely engaged in agriculture, and are peaceful and of good habits, but the more turbulent Cheyennes are less disposed to yield their old habits of life.

During these troubles with the southern Cheyennes the northern band continued peaceful, though urged by the Dakotas to join them in the hostile outbreaks of the latter tribe. In the treaty concluded with the Dakotas in 1868 the northern Cheyennes and Arapahoes were overlooked, and no reservation was provided for them. There was nothing left for them but to continue their old habits of nomadic hunting. In consequence they were regarded as hostile. Efforts were subsequently made to induce them to join the southern Cheyennes on their reservation, but they preferred to remain on the reservation of the Sioux, on which they were domiciled in 1876. A party of them became involved in the Sioux war which subsequently broke out. It was decided to punish them for this participation, and a large force of troops was led against a Cheyenne village in the Big Horn Mountains, though there was no proof that any of its inhabitants had taken part in the hostilities. The village, which contained 1200 inhabitants, was surprised and burned, many Indians were killed, and all their property and their winter store of provisions destroyed.

In 1877 the decision to remove them to the Indian Territory was put into effect. Much dissatisfaction with this movement was felt by the Cheyennes, who were wild horsemen and had never been under the discipline of an agency. In the succeeding year this dissatisfaction culminated in the escape of a party of 300 Indians from the reservation and their rapid flight towards their old home. The fugitives were hotly pursued, and after a running fight were captured and confined in Fort Robinson. From this place they made a second escape, and were again pursued, surrounded, and after a hard fight were all killed or wounded. Very few returned to the agency.

The story of the Cheyennes forms one of the most striking instances of Government vacillation in its dealings with the Indians, of the unjust dealings of Indian agents, and of that blind haste to punish first and investigate afterwards, which have been so many times exemplified in the history of Indian wars.

In Col. Wynkoop's statement to the Government respecting the dealings with the southern Cheyennes

he pointedly declares that a few thousand dollars applied to the subsistence of the starving Indians at the right time would have saved millions to the treasury, have preserved the lives of many of the whites, have obviated the necessity of hunting and destroying the innocent for the faults of the guilty, and of driving into misery great numbers of helpless women and children. The Cheyennes now number about 3600. Their reservation is in the western part of the Indian Territory, and, in common with that of the Arapahoes, includes 6715 square miles. As yet they have shown little inclination to conform to the new conditions of life offered them.

CHICAGO, the largest city of Illinois, and the county-seat of Cook county, is the fourth city in population in the United States, while in commercial importance it is second only to New York. It is on the south-western shore of Lake Michigan, 18 miles from its southern extremity, 87° 37′ W. long. Dearborn observatory, which is 3½ miles south and ¾ mile east of the court-house, is in lat. 41° 50′ 1″ N. and long. W. from Greenwich 87° 37′, and W. from Washington 10° 33′ 40.″ The shore-line of the lake at the city is nearly due north and south. Chicago is 715 miles west by north from New York City on an air-line, 260 north-north-east from St. Louis. It extends north and south along the lake about 9 miles and west 5 miles, having an area of about 40 square miles. It is 592 feet above the sea-level, and was originally but a few feet above the level of the lake; but the grade was raised in 1867 from 5 to 10 feet, making the present level of the city 14 feet above the lake at the East Side and 28 feet at the West—a sufficient grade for drainage. The bayou called the Chicago River divides the city into three unequal parts, called the North, South and West Sides; the larger part of the trade is on the South Side. This bayou is about 100 yards wide at its mouth, and has been made very deep by dredging, banking, etc. About five-eighths of a mile directly west it separates into two parts, called the North Branch and the South Branch, the direction of each indicated by its name, and both running nearly parallel with the shore-line of the lake. This bayou, its branches, and numerous artificial "slips" furnish a harbor-frontage of 38 miles, nearly all of which is improved. This does not include the harbor proper of the lake. Along this river are located the large grain-elevators, lumber-yards, etc., and most of the railways have connection with it. Originally the site of the city possessed few natural advantages, no beauty, and was far from healthful; but the city, State and national governments have by artificial improvements so changed all these conditions that few cities of its size have superior advantages.

See Vol. V. p. 530 Am. ed. (p. 610 Edin. ed.).

Name and History.—The name, Chicago, is pronounced by some to be an Indian word for "wild-onion," a plant which originally grew in great abundance along the borders of the river. By others, with more dignity if not with more accuracy, it is traced to a corruption of the word *checaqua*, a term given by the aboriginal Illini tribe of Indians to a long line of chiefs, and by early geographers to the territory of the Mississippi Valley from the source of the river to the Gulf; the meaning of the word *checaqua* is "strong." The first white men known to have visited the site of Chicago were Fathers Marquette and Joliet, Jesuit missionaries, who in 1662–63 passed up the river through the South Branch, through Mud Lake to the Des Plaines River, and on to the Mississippi River. All this territory was then claimed by France, but it became the property of Great Britain in 1759, and was lost to that country in the Revolution. Illinois was organized as a county of Virginia in 1778, ceded to Ohio in 1784, attached to Indiana in 1800, and organized by Congress into the "Territory of Illinois" in 1809, with Ninian Edwards as governor. A State government was formed in 1818. The first resident of Chicago was a negro, a refugee from San Domingo, named Jean Baptiste Point au Sable, who built a rude log cabin on the north bank of the main river in 1790. His object, seems to have been to ingratiate himself with the Illini Indians, who inhabited all the neighboring territory, for the purpose of founding a retreat for others like himself. He did not succeed, and stayed but three years. He was followed by Le Mai, a Frenchman, who stayed but a short time. He sold out to John Kinzie, an employé of the American Fur Company, who enlarged the hut of Baptiste and became the first permanent white settler. An Indian trading-business was soon established, of such importance that in 1804 the general government erected a log stockade named Fort Dearborn. During the war of 1812 this fort was completely destroyed by the Indian allies of England, and until the rebuilding of the fort, in 1816, the place was entirely deserted by all save the Indians. The second Fort Dearborn remained until 1837, when it was abandoned, the Indians having all removed westward, and there was no further necessity of the garrison; it remained standing until 1856, when it was demolished to make way for commerce. The first noticeable impetus given to Chicago was in the project and construction of the Illinois and Michigan Canal, connecting the South Branch of the river with the Illinois River at La Salle, a distance of 96 miles. The building of this canal was first agitated in 1814, but not until 1823 was a board of canal commissioners appointed; and the ground was not broken until July 4, 1836. The canal was completed in 1848, at a cost of about $6,500,000. The highest point of this canal was originally 12 feet above the lake, but in 1876–80 the city deepened it, at a cost of $3,251,621, and its highest point is now 8½ feet below the level of the lake. This change of depth was of immense advantage, dispensed with locks, gave a constant current sufficient to keep the channel clean, and to carry off the sewage of the city at the rate of one mile per hour. The canal leads into rich coal-fields, fine building-stone and fertile agricultural regions, and the traffic in these branches of business is no insignificant part of the whole business of the city. In 1829 the first survey was made and the first census taken; the latter showed less than ten families outside the walls of the fort. The prospect of a speedy completion of the canal attracted settlers, about four hundred coming in September, 1831. The year 1832 witnessed further gains in immigrants; the opening of the first school, with twelve pupils; the first Sunday-school, with thirteen in attendance; and the establishing of the first pork-packing house—a business in which Chicago has now no rival in the world. In 1832, Congress appropriated $30,000 for improving the lake harbor, which money was received and applied to its purpose the same year; this was accompanied by the erection of about one hundred and fifty frame houses, with a family for each, and the establishment of a post-office with a weekly mail service. Chicago was incorporated as a city in March, 1837, and its rapid growth in population and wealth since that time is shown by the following table:

Year.	Population.	Personal and Real Estate.	Amount Tax.	Debt.
1837	4,170	$ 236,842	$ 5,905	$ 9,996
1840	4,479	94,437	4,721	6,559
1850	28,269	7,220,249	25,270	93,395
1860	109,206	37,053,512	373,315	2,336,000
1870	306,605	275,986,550	4,139,798	11,041,000
1880	503,298	117,133,643	3,899,120	12,752,000
1882	560,693	125,358,537	4,227,402	12,752,000
1883	600,000	133,230,504	4,287,493	12,751,500

In 1880 the occupations of the people were as follows:

Occupations.	Males.	Females.	Total.
Agricultural pursuits	1,123	67	1,190
Professions and personal services	39,966	18,679	58,645
Trade and transportation	53,056	1,957	55,013
Manufacturing and mechanical pursuits	62,013	14,899	76,912
Total	156,158	35,602	191,760

The census of 1890 makes the population 1,098,576, and raises Chicago to the second place among American cities. This great increase was part due to the annexation of suburban towns, the large town of Hyde Park and the smaller ones of Lake, Lake View, and parts of Jefferson and Cicero, being brought within the city limits. These various additions increased the area of Chicago to 150 square miles. The rapid growth of this city is without parallel in the world, and its population promises a continued rapid increase.

One of the greatest conflagrations of modern times commenced in Chicago at 9.30 P. M. on Sunday, Oct. 9, 1871, and continued until the following Tuesday evening. It began in the south-west part of the city, and was carried by a strong south-west wind directly through the finest and wealthiest parts of the city. The total area burned over was 2100 acres, or nearly 3½ square miles; the number of buildings destroyed was 17,450; persons rendered homeless, 98,500; killed, nearly 200. The total loss on buildings was $50,000,000; on personal property and merchandise, $140,000,000; total, $190,000,000, of which about $44,000,000 was recovered on insurance. Contributions for the relief of the fire-sufferers came in from all parts of the world, and one month after the fire $3,500,000 was subscribed and $2,050,000 of this paid in. About $7,000,000 was contributed from outside sources. The burnt district was not suffered to lie idle. Buildings began to arise before the ashes were cold, and three years afterward but a rare trace of the fire could be found. The new city is much better built than the old, and its rapid recovery from the stupefying effects of its great conflagration and its marvellous growth for the last twenty years are the wonder of the century.

Railways, etc.—Nothing has contributed more to the growth of Chicago than its railways, and nothing adds more to its power, its business facilities, and its wealth. The first road to reach the city was the Lake Shore and Michigan Southern, in February, 1852; the Michigan Central reached the city in May of the same year. The first road built from the city was begun in 1847, on a line toward Galena; there were 42 miles of this in 1850. Now there are nearly forty different roads meeting in the city, making it the greatest railway centre in the world. The principal roads are the Chicago and Alton; Pittsburg, Fort Wayne, and Chicago; Chicago, Milwaukee, and St. Paul; Pittsburg, Cincinnati, and St. Louis; Chicago, Burlington, and Quincy; Illinois Central; Michigan Central; Chicago, Rock Island, and Pacific; Lake Shore and Michigan Southern; Chicago and Grand Trunk; Chicago and Eastern Illinois; Wabash, St. Louis, and Pacific; Baltimore and Ohio; Chicago and North-western; Chicago and Atlantic. The entire railway system embraces more than 25,000 miles of track. With their connections they reach every city and town of importance in the country, from ocean to ocean, and from the farthest North to the Gulf of Mexico. About nine hundred trains arrive and depart daily, making 1800 arrivals and departures, carrying 50,000 passengers and 120,000 tons of freight. The traffic of these roads is immense, representing gross receipts of about $500,000,000, with net profits of over $50,000,000. The principal dépôts are the Central, on the West Side, near Madison Street, into which come the Pittsburg, Fort Wayne, and Chicago and the Pittsburg, Cincinnati, and St. Louis from the east, the Chicago, Milwaukee, and St. Paul from the north and the north-west, the Chicago, Burlington, and Quincy from the west and the south-west, the Chicago, Alton, and St. Louis from the south and the south-west. The great North-western system has its dépôt on the North Side, near Fifth Avenue. The Lake Shore and Michigan Southern and the Chicago, Rock Island, and Pacific occupy one dépôt on the South Side. The Illinois Central dépôt is on the lake, at the foot of Lake Street. Street-cars run everywhere through the city, on nearly each alternate street. There are three companies—the Chicago City Railway, operating principally on the South Side (this company introduced in 1882 the endless-cable power of propelling its cars, and several of its lines are run by this motor with great success); the North Chicago City Railway Company, operating chiefly on the North Side, though running to the South; and the West Division Railway, confined to the West Side largely, and crossing on Madison Street to the South. Some of these lines are 7 miles long, making the round trip 14 miles.

The following table shows the arrivals and clearances at the port of Chicago in 1883:

	Arrived.		Cleared.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Coasting-vessels	11,814	3,758,272	11,781	3,885,101
Foreign vessels	93	35,912	100	88,295
American vessels from foreign ports	60	18,280	184	57,477
Total	11,967	3,812,464	12,015	3,980,873

General Business.—In the general volume of business transacted, Chicago stands second only to New York, and it is first in the trade in lumber, live-stock, and grain; in these three commodities it leads all the cities in the world. Since the establishment of a clearing-house in 1865 the amount of business transacted annually has been accurately ascertained. With the exception of the years 1875–78, during which time there was a general financial depression, there has been a steady and marked increase in the volume of business. This increase was 141 per cent. between the years 1873 and 1883, and about sixfold increase between 1866 and 1883. The increase of 1883 over 1880 was 46 per cent. The following table exhibits the amounts as given in the clearing-house reports for the years named:

1865 (9 mos.)	$319,606,000.00	1875	$1,212,817,207.54
1866	453,798,648.11	1876	1,110,093,624.37
1867	580,727,331.43	1877	1,044,678,475.70
1868	723,293,144.91	1878	967,184,093.07
1869	734,664,949.91	1879	1,257,756,124.35
1870	810,676,036.28	1880	1,725,684,894.85
1871	868,936,754.20	1881	2,249,097,450.60
1872	993,060,503.47	1882	2,366,536,855.00
1873	1,047,027,828.33	1883	2,525,622,994.00
1874	1,101,347,948.41		

The duties collected on the foreign trade were as follows:

1874	$1,358,496.22	1879	$1,807,052.71
1875	1,609,157.21	1880	2,548,406.87
1876	1,454,725.85	1881	2,932,030.61
1877	1,448,705.01	1882	3,696,711.09
1878	1,451,535.87	1883	4,075,166.85

The grain-trade of Chicago is larger than that of any other city in the world. A review of it shows a most wonderful development and a present status that almost challenges belief. In 1838 the receipts in grain were 78 bushels; in 1840, 10,000 bushels were marketed; five years later the receipts had grown to 1,025,620 bushels; and in 1850 there were marketed, of all sorts of grain, 1,830,968 bushels. From 1850 the growth in the grain-trade was very rapid, and the receipts of all kinds of grain and flour, reduced to the equivalent of wheat, in 1860, were 31,108,759, and in 1870, 54,745,903 bushels.

The following table exhibits the aggregate receipts and shipments of flour (reduced to bushels) and all kinds of grain at Chicago since 1870:

Year.	Bushels.	Year.	Bushels.
1871 (received)	83,518,202	1871 (shipped)	71,800,789
1872	88,426,842	1872	83,364,224
1873	98,935,413	1873	91,597,092
1874	95,611,713	1874	84,020,691
1875	81,087,302	1875	72,369,194
1876	97,735,482	1876	87,241,306
1877	94,416,399	1877	90,706,076
1878	134.086 595	1878	118,675,269
1879	138,154,571	1879	125,528,379
1880	165,855,370	1880	154,377,115
1881	145,020,829	1881	140,307,597
1882	126,155,483	1882	114,864,933
1883	164,924,732	1883	141,720,259

The shrinkage for 1882 was caused by a shortage of corn to the extent of over 500,000,000 bushels, the loss falling more heavily on Chicago because of its closer relation to the corn-belt than upon other cities. In 1883 the business regained almost its highest point. The following exhibit shows the enormous transactions in grain at this mart:

Received.	1883.	1882.	1881.
Flour, bbls.,	4,295,515	4,378,864	4,942,911
Wheat, bush.,	20,364,155	22,326,680	15,077,051
Corn, "	74,412,319	49,224,522	78,276,422
Oats, "	36,502,283	26,975,137	24,941,397
Rye, "	3,838,554	2,052.214	1,460,102
Barley, "	4,643,011	2,066,633	6,551,520
Total in bushels	164,924,732	122,350,074	148,549,591

Shipped.	1883.	1882.	1881.
Flour, bbls.,	3,999,431	3,995,332	4,639,388
Wheat, bush.,	11,728,754	19,905,319	17,474,541
Corn, "	71,666,508	49,264,167	74,213,837
Oats, "	31,845,993	23,975,177	23,250,297
Rye, "	3,838,554	1,928,874	1,177,464
Barley, "	4,643,011	4,130,069	3,057,655
Total in bushels	141,720,259	117,182,590	140,051,010

The direct export of wheat to Europe in 1882 amounted to 2,270,586 bushels, and of corn to 1,260,908, and in 1883 wheat 2,124,441 bushels, corn 2,893,870. The capacity of the elevators of the city is 24,450,000 bushels. There are twenty-four elevators, ranging from the Fulton, with a capacity of 300,000 bushels, to elevator D of the Chicago, Burlington, and Quincy Railroad, with a capacity of 1,800,000 bushels. Six others have a capacity of 1,500,000 bushels each. Besides these, the steamers and lake-craft laid up in this port for winter provide additional storage of about 10,000,000 bushels, and these are generally filled each year.

As a live-stock market Chicago has no rival in the world as a primary receiving-point. The centre of the trade, both in live-stock and in packing, is at the Union stock-yards, which are situated in the south-western part of the city, about six miles from the court-house. These yards are the most extensive and complete in the world; all railroads entering and leaving the city have connection with them. They comprise 345 acres and have a capacity for 21,000 cattle, 75,000 hogs, 25,000 sheep, and 500 horses, or about 150,000 daily. There are in the yards 31 miles of drainage, 7 miles of streets, 3 miles of water-troughs, 10 miles of feed-troughs 1500 open and 800 covered pens for stock. They were opened for business Dec. 25, 1865, and the cost of building was $3,000,000. The water is supplied from an Artesian well 1100 feet deep. The following shows the receipts and shipments for the past three years:

Year.	Cattle.	Hogs.	Sheep.
1881. Received,	1,498,550	6,474,844	493,624
" Shipped,	938,712	1,289,679	253,938
1882. Received,	1,582,530	5,817,504	628,587
" Shipped,	921,153	1,787,918	314,200
1883. Received,	1,878,944	5,697,163	749,917
" Shipped,	966,758	1,363,759	374,463

The estimated value of all the stock sold in this market during the year 1883 is $201,252,772. The value of the hogs alone was $84,609,375; of cattle, $110,550,550; of sheep, $3,000,100; and of calves, $423,122. The number of hogs received in 1857 was 244,345; in 1862 it reached 1,348,890, fell off in 1865 to 849,311, reached 1,286,326 in 1866, 2,652,549 in 1871, and 3,488,528 in 1872. The receipts of cattle were 48,524 in 1857, and increased steadily every year, reaching, in 1872, 684,075. Until recently the cattle received have been largely shipped to the Eastern market, while the hogs have been dressed and packed, but during the year 1882, of the 1,582,530 cattle received, 345,000 head were made into canned goods and 300,000 fell into the hands of dressed-beef shippers. In 1883 the number of cattle packed was 697,000.

The pork-packing interest is a vast one. The number of houses engaged is twenty-three, with a capacity of 71,250 hogs per day. Owing to the failure of the corn-crop there was in 1882 a falling off of 1,100,000 hogs packed, as compared with the previous year. This serves to show the intimate relations of the corn-crop with this interest. The aggregate packing for the year 1883 was 4,222,780 head, as against 5,697,163 received, leaving nearly 1,500,000 for further shipment. The number of hogs packed in 1851–52 was 22,036; in 1860–61 it was 271,805; in 1870–71, 919,197; in 1871–72, 1,225,236; in 1872–73, 1,456,650. There were twenty-seven packing firms in 1872, besides several smaller houses; one firm alone packed 373,725 hogs during that season. The packing of beef-products reached 51,606 head in 1860, and 92,459 in 1865. Since that time it has been declining, partly on account of the erection of packing-houses farther west, and partly because the use of refrigerator-cars allows the shipment East and to foreign markets without packing. The following table shows the amount of hog-products handled for the last three years:

Received.	1881.	1882.	1883.
Cured meats, lbs.,	138,787,745	106,944,533	139,971,942
Pork, bbls.,	52,298	79,266	53,636
Lard, lbs.,	61,403,671	48,233,342	72,010,072
Shipped.	**1881.**	**1882.**	**1883.**
Cured meats, lbs.,	782,993,729	620,928,579	643,994,263
Pork, bbls.,	319,999	431,361	340,307
Lard, lbs.,	278,531,733	240,661,733	255,226,039

In the lumber-trade, Chicago is the great distributing-point of the West. During the year 1883 it received by lake and rail 1,909,910,000 feet of lumber, the cost (including transportation, assorting, piling, dockage, etc.) being $4,400,000. For the shipment of 1,065,000,000 feet during the same period the railroads received $4,000,000, and the receipts of vessel-owners were $3,000,000. A large part of this lumber is dressed and manufactured here, giving employment and support to over 50,000 persons and aggregating over $12,000,000 annually. The receipts of lumber, exclusive of shingles, were, in 1852, 147,816,292 feet; in 1860 they were 262,494,626 feet; in 1870, 1,018,998,685 feet. The number of shingles received during the same years was, respectively, 77,080,500, 127,894,000, 652,091,000.

In summing up the general business of the city the following table, taken from the report of the secretary of the Board of Trade, shows the estimated value of the various articles shipped during the years 1882 and 1883, with a comparison of totals for preceding years:

	1882.	1883.
Flour and grain	$ 90,388,000	$ 90,631,000
Live-stock	100,939,000	93,208,000
Meats, lard, tallow, etc.	117,592,000	116,160,000
Butter and cheese	17,114,000	19,340,000
Wool and hides	24,778,000	23,654,000
Seeds and broom-corn	9,358,000	9,260,000
Distilled spirits	2,451,000	
Miscellaneous	9,924,000	13,510,000
Total,	$372.544.000	$365,763,000

Total, 1881	$340,675,000
Total, 1880	305,400,000
Total, 1879	252.152,000

Manufactures.—According to the census of 1880, in Chicago, there were 3519 manufacturing establishments with a capital of $68,836,885, employing 79,414 hands, of whom 62,431 were males above sixteen years of age. The total amount paid in wages during the previous year was $34,653,462; the value of the materials used was $179,209,610, and the value of the products $249,022,948. The development of manufacturing industry has not kept place with that of trade and commerce, but the report of the year closing Dec. 31, 1883, shows that Chicago ranks fifth among the manufacturing cities of America, and shows a greater rate of increase in this department than any other city. Almost every branch of manufacturing industry is found here, especially those in wood, iron, the finer minerals, clay, etc. The principal manufactures are iron, flour, distilled liquors, agricultural-implements, pork and meats, boots and shoes, leather, cotton, and watches. Shipbuilding employs many thousands of workmen. About one-fourth of the business of the city, especially its commerce, is based on the productions of its manufactures, and about one-[illegible] of its population, or 65,000 hands, are engaged [illegible] Its contiguity to the forests of Michigan, Wisconsin, and Minnesota, and to the copper- and iron-[illegible] of Lake Superior, give it great advantage in [illegible]ducts. Excellent clay for making brick, sewer-pipe, etc., is found in abundance near the city, and over 2,500,000,000 bricks are made annually.

There are 7 distilleries, 30 breweries, 67 rectifying houses, 141 wholesale liquor-houses, 75 saloons for malt liquors, 5000 for distilled liquors, 477 cigar manufactories, 7 tobacco manufactories, 9000 licensed retail sellers of tobacco. The total amount of revenue from liquors and tobacco for the year 1883 was $8,774,891.

City Administration, etc.—The city is divided into 18 wards, numbered consecutively. The municipal government is vested in a mayor, and two aldermen from each of these wards. The municipal receipts for 1883 were $8,772,578.18, and the total expenditure $8,497,606.26. The number of buildings in the city at the close of 1881 was 137,098. During the year 1882 there were erected 3113 new buildings and 2005 wooden sheds, making the total number of buildings at the close of 1882, after deducting fifteen destroyed by fire in that year, 142,201. The cost of the new buildings in 1882 was $16,286,760. The materials used were chiefly stone, brick, and iron, the ordinance passed after the great fire of 1871 forbidding the erection of wooden buildings inside the municipal boundaries being still in force, in spite of frequent attempts to rescind it. Its provisions have necessarily added to the exterior beauty of the city, while ensuring the general safety against a repetition of the memorable conflagration. The fire department of Chicago is in a high state of efficiency. It consists of 33 engines, 9 hook-and-ladder companies, 6 chemical engines, and employs 397 men with 178 horses. It has 37 buildings, worth $305,150; real estate, $214,655; apparatus, $558,667.38; total, $1,078,472.38. Of rubber hose, 41,739 feet is used by the department, and 503 miles and 2694 feet of main and distributing pipes. The number of fires in 1882 was 1304, involving a total loss of $569,885. The expense of the department for the same year was $552,000. The police force consists of 557 men in regular employ; there are 17 stations, with a value, including the land, of $321,455. During the year 1882, 32,800 arrests were made, $159,495 of fines were imposed, $121,929.37 worth of property reported stolen, $91,265.35 worth of property recovered. The expenditures of the police department for this year were $745.542 for salaries, $68,423.50 for miscellaneous expenses, $21,000, for new sites and buildings; total expenditures, $834,965.50. This department is inadequate to the needs of the city, but is under excellent discipline and ranks among the best in the country for official integrity.

Chicago now stands third on the list of large American cities in its death-rate, the number of deaths per thousand inhabitants being 23.60, while in New York it is 29.64; in Philadelphia, 22.62; in Brooklyn, 24.84.

The department of health furnishes the following table:

	Population.	Deaths.	No. of Deaths per 1000.
1875	407,000	7,899	19.41
1876	420,000	8,573	20.41
1877	439,776	8,026	18.24
1878	450,000	7,422	16.50
1879	475,000	8,614	18.01
1880	503,298	10,462	20.79
1881	540,000	13,874	25.69
1882	560,693	13,234	23.60

Sanitarians assert that defective sewerage caused the notable increase in the ratio of deaths since 1878.

Persistent efforts to improve the health conditions have been made, and are considered fairly successful.

In 1882 the prevailing direction of the wind was south-west; the mean temperature was 49°.6, highest 89°.5, and lowest 7°.1 below zero. The rainfall was 41.18 inches. The mean annual relative humidity was 75.4 per cent.

Water-Supply.—The water-works of Chicago form one of the largest and best systems in the world. The water is taken from the lake two miles from the shore, received at two points, and thence distributed over the city. The North-Side works are located near the lake, on Chicago avenue; these consist of pumping-engines and a stand-pipe, or tower, 175 feet high. On March 17, 1864, the work of building a tunnel under the lake was begun, and finished Dec. 6, 1866. A shaft which consists of an iron cylinder 9 feet in diameter was sunk; from this a tunnel extends two miles in a straight line and at right angles with the shore; the diameter of the tunnel is 5 feet. At the east, or crib, end it is 66 feet below the water-level of the lake, under a head of 18 feet, with a velocity of 4⅞ miles per hour, and will deliver 57,000,000 gallons of water daily. At the water end of the tunnel stands the "crib." It was built on the shore, and towed out July 25, 1865. It is built of logs a foot square bolted together. Its dimensions are 98½ feet in diameter, 40½ feet high. The form is pentagonal, with three walls 11 feet apart; the diameter of the central space is 25 feet, within which an iron cylinder 9 feet in diameter reaches to the tunnel below. The water is forced by the engines into the tower, from which it is distributed by its own weight through pipes to all parts of the city. (See, also, AQUEDUCTS, Vol. I. p. 272.) A similar tunnel was constructed a few years after, 7 feet in diameter and 6 miles long, running south-west under the city to the corner of Ashland and Blue Island avenues and Twenty-second street. In these works is the largest engine in the world, being 1200 horse-power, with a fly wheel 26 feet in diameter, pumping 2750 gallons at each stroke, and costing $200,000. The four engines here are equal to 3000 horse-power. The supply of water is pure, cool, and inexhaustible, and the pumping capacity of the entire system is 150,000,000 gallons daily. The highest actual supply has been 78,000,000 gallons, and the daily average about 65,000,000 gallons. In 1882 the city had 472.3 miles of water-pipe and 3825 fire-hydrants. The cost has been over $8,000,000, and the works are now the property of the city. The total expense for the year 1882 was $1,307,590.55. The income for the same time was $1,473,386.17, leaving a balance to the credit of the city of $102,795.62.

Streets, Parks, etc.—With the exception of a few streets which abut on the lake and are interfered with by the river and its branches, the streets of Chicago are regularly laid out, with an average of 80 feet in width, and cross each other at right angles. The numbering is from the river east and west, and from Lake street north and south. In 1872 there were 534 miles of streets, of which 94 miles were improved; in 1878 there were 8 miles of sidewalk built; in 1881, 137 miles, and in 1882, 75. There are now nearly 1000 miles of streets, some from 5 to 9 miles in length. Many of the pavements are in an unsatisfactory condition, owing to the nature of the soil and the character and quality of the materials used, for the most part wooden blocks, which speedily decay. Asphalt, granite, and durable materials are coming into use. The streets are well lighted with gas and oil-lamps, of which there were in use, at the close of the year 1882, 11,784 for gas and 2049 for oil. The electric light is in use in many public buildings, but has not yet been employed by the city for the streets. The sewerage of the city has been greatly extended in recent years, and over 380 miles of pipe are in use. The North, West, and South Sides are connected with 33 bridges, which are placed at the distance of two squares apart, and swing on central pivots when boats are passing. In 1868 a tunnel was made under the South Branch at Washington street. It is 1608 feet long, including the entrances, has a descent of 26 feet, a double roadway for vehicles and a separate passage for pedestrians, and cost $400,000. A similar tunnel was built in 1870 under the main branch of the river at La Salle street, and connects the North and South Sides. Its length is 1890 feet, and it cost $540,000. The boulevards of Chicago surpass those of any other city on the continent; they are 250 feet wide, finely paved, shaded, and kept. They are reserved for carriage-driving, and form a connecting chain between the principal parks. There is a continuous drive of 40 miles of boulevard. The parks are many, large, and beautiful. The oldest and best is Lincoln, on the North Side, having a front of more than two miles on Lake Michigan. It contains 310 acres, and is noted for its flower-beds, zoological gardens, and groves of natural trees. Going west and south from the north end of this park, a boulevard 3½ miles long leads to Humboldt Park, containing 194 acres. Thence south-west by boulevard 2 miles is Garfield Park, formerly called Central. It is directly west of the mouth of the Chicago River about 5½ miles, and contains 185 acres. Adjacent to it is the Jockey Driving Park, a great resort in the sporting season. One and one-half miles south lie Douglas Park, containing 171 acres, and beautified with a lake covering over 12 acres. A boulevard connects Douglas Park with the south park system, the most western of which is 9 miles from Douglas. These south parks lie just outside the city limits, and contain in all 1055 acres, 14 miles of interior drives, and 30 miles of walks. The two main divisions of these parks are approached by two grand parkways, called the Drexel and Grand boulevards, the finest in the country. The former is modelled after the Avenue l'Impératrice of Paris. Coming north from the south parks is the East, or Jackson, Park, containing over 600 acres and 2 miles of lake frontage. A magnificent boulevard called the Midway Plaisance will eventually connect this with the south parks; this boulevard is 600 feet wide. Besides those named, there are many smaller parks distributed over the city, the largest of which are Lake, containing about 10 acres, and Union, about 6 acres. These small parks are the lungs of the city. On the parks within the confines of the city $12,330.28 were expended in 1882.

The finest and most elaborate building in Chicago is the new court-house and city-hall. It was begun soon after the fire of 1871, and is not yet completed, though occupied for various purposes. It is on the public square, has a frontage of 280 feet on Washington street and 340 feet on Clark and La Salle streets. It is in the modern French Renaissance style of architecture, with a colonnade story of Corinthian columns surrounding the sub-building; the columns are of polished granite, 35 feet high, and support an elegantly-proportioned entablature, which is divided into architrave, frieze, and cornice. Over this entablature is an attic story with allegorical groups, each nearly 12 feet high, representing Agriculture, Commerce, Mechanical Art,

Plenty, etc. The building is 120 feet high, the façades on Washington and Randolph streets being about 280 feet high, and the tower, when completed, will rise to a height of 376 feet. The hall has cost about $4,000,000 already. It is used for both city and county business.

The next building is the new post-office and custom-house, built by the government, and finished in 1881 at an expense of $6,000,000, including cost of ground. It occupies a square, measures 344 by 240 feet, is three stories high, with a basement and attic, built of stone in the style known as Romanesque with Venetian treatment. The basement and ground-floors are used by the post-office department; the second floor is for customs, internal revenue, sub-treasury, commissioners of pensions, and mail agents; the third floor, for courts of the United States and for offices connected with the Department of the Interior.

The Exposition building was erected in ninety-six days in 1873 at a cost of $400,000. It is the largest building in the world without interior supports, being 1000 by 225 feet. It has accommodations for 50,000 people. The Republican national conventions of 1880 and of 1884 were held in the south end of this building. Next in size to this is the Cook County Hospital, on the West Side. There are several buildings connected with this; it is said to be the best-ordered hospital in the world, and has accommodations for about 1000 patients. The Board of Trade building is opposite the city-hall, on Washington street. The bulk of the business of the city is transacted here, the daily trade often reaching 10,000,000 bushels of cash and future deliveries of grain and other products. It deals in all products except lumber, for which there is a Lumber Exchange. Chicago has been selected as the site of the Columbian World's Fair, in celebration of the 400th anniversary of the discovery of America. The buildings for this Exposition, which is to be held in Jackson Park will have considerably greater floor space than the Centennial Exhibition of 1876.

The CHICAGO UNIVERSITY (*q. v.*) stands upon grounds in the south part of the city, presented for the purpose by the Hon. Stephen A. Douglas. On the same grounds are the Dearborn Observatory, containing the finest equatorial telescope in the country, and a monument over the mausoleum of Douglas; it is a simple column 35 feet high with a bronze statue of Douglas.

Education.—The public schools of Chicago take a high rank for efficiency, but cannot be considered sufficient for the demand, as the increase of population constantly exceeds both the expectations of the municipal authorities and the power of the taxpayers to anticipate the expenditure required for public purposes. In 1840 the total enrolment in the public schools was 317; in 1850, 1919; in 1860, 16,547; in 1870, 38,939; in 1880, 59,562; and in 1883, 72,509; but for this total enrolment there are only 56,583 sittings, 12,919 pupils receiving instruction during only one-half the daily school session, and 2480 applicants being excluded for want of room. The pressure upon the public schools is measurably relieved by private schools, denominational and secular, which, without public aid, provide for 32,038 pupils. The denominational schools are chiefly Roman Catholic, and are taught by lay instructors or by members of religious orders. In 1872 the number of public schools was 32, with 45 buildings, 476 teachers, 38,035 pupils enrolled; teachers' salaries amounted to $359,588, and the assessed value of buildings was $1,071,100; real estate, $1,194,452. In 1883 the number of school-buildings was 68; teachers, 1107; pupils, 72,509; the salaries paid teachers amounted to $771,065.37, while the total pay-roll was $846,207.10, making the average cost per pupil on average daily attendance $16.55. Of the teaching force there were 60 principals—37 in grammar schools, 20 in primary schools, and 3 in high schools. There are special superintendents for German, music, and drawing. The total school revenue for 1882–83 was $1,434,571.32, and the total expenditure $1,327,837.63. The per cent. of school-tax on the total amount levied was 28.2. The high schools cost $50,810.13 in 1882, at an average cost per pupil, the enrolment being 1377, of $43.83. The schools for deaf-mutes enrolled 57 pupils, with 6 teachers, at an annual expense of $4264.10, or an average cost of $71.53 per pupil. Evening schools, conducted during a portion of the winter, in 1883 had a total enrolment of 6956 pupils, at an average cost per pupil of $8.94. In the evening high school the average cost per pupil was $13.55. The total value of the school property in 1883 was $6,210,073.80. In the school census for 1882, 241,693 persons were under 21 years of age, 155,166 were between the ages of 6 and 21, and 110,389 were between 6 and 16.

Besides the public schools, there are many educational institutions, among which are 4 theological seminaries, 1 college of photography, 2 musical colleges, 3 literary colleges—in all, 14 colleges, art-schools, and seminaries. Of the medical colleges, there are 4 of the regular school, 1 eclectic, 2 homœopathic, 1 college of pharmacy, 1 training-school for nurses, 2 eye and ear infirmaries, 1 dental infirmary, 13 hospitals, 12 free dispensaries, 26 homes and asylums, 12 medical societies, and 1025 practising physicians, of whom about 100 are women.

Churches.—Chicago has more than 350 churches, and 83 religious societies. The Roman Catholics stand first in numbers, with 1 cathedral and 44 churches and about 45,000 members. The Methodist Episcopal denomination has 36 churches, 5686 members, 10,000 Sunday-school children, and property valued at $750,000; the Lutherans have 32 churches, 15,000 members, 6500 Sunday-school pupils, and property valued at $400,000. The other principal denominations have churches as follows: Baptist, 29; Christian, 4; Congregational, 19; Protestant Episcopal, 16; Reformed Episcopal, 8; Jewish, 12; Presbyterian, 24; Unitarian, 3; Universalist, 3.

There are 22 cemeteries, 14 convents, 60 temperance societies, 80 trades unions, and 704 secret societies, including 73 Masonic, 59 Odd-Fellows, 33 Knights of Pythias, 24 Knights of Honor, etc.

There are 11 libraries and reading-rooms, the most important of which is the Chicago Public Library, which was opened in January, 1873. It is sustained by taxation, $50,000 being appropriated to its use in 1882. In June, 1883, there were 94,606 volumes on its shelves; 376,475 volumes were taken out during the previous year, and 543,456 persons made use of its reading-room, while the visitors to the reference-tables numbered 42,734. The librarian is William Frederick Poole, LL.D. The yearly augmentation has been 10,000 volumes since 1875. It is now proposed to use Dearborn Park as the site of a suitable fire-proof building for the library.

In the issue of newspapers, periodicals, and books, Chicago stands next to New York among American cities. The daily papers especially are large, influential, and have large circulation; the *Times* and *Tribune* are each valued at about $800,000. The first paper was started in 1833 and called the *Democrat*, being

edited and published by John Wentworth; in 1861 it was merged into the *Tribune*. The *News* has a daily circulation of 100,000, the *Tribune* of 65,000, *Times* of 55,000, *Inter-Ocean* of 18,000, and the *Journal* of 10,000. There are in all 234 periodicals, of which 25 are daily, 125 weekly, and the others at longer periods; there are about 60 juveniles and 35 religious papers. There are numerous publishing-houses of books, whose issues are of a high standard of literary and mechanical excellence.

There are over 200 hotels, capable of accommodating from 50 to 1000 guests each; among these, the largest are the Grand Pacific, Palmer's, Sherman, Tremont. The Palmer House cost about $3,500,000, and the Grand Pacific about the same.

Theatres, art-galleries, and public halls are numerous, most of them dating since the great fire of 1871. They are generally of a style of magnificence creditable to the wealth and taste of the city. The churches, colleges, and asylums also are of fine architecture, imposing, and costly. But the chief peculiarity of the general aspect of Chicago is the number, regularity, and capaciousness of its business blocks and buildings, in which regard it is not surpassed by any other city on the Western continent. (M. F. S. & A. G. M.)

CHICAGO, UNIVERSITY OF, in the city of the same name, owes its origin to the Hon. Stephen A. Douglas. It was his intention to found a university which should be worthy of the Western metropolis and partake of its enterprise and prosperity, and yet be under the fostering care of the State. With this purpose, in the year 1854 he made known his willingness to give ten acres of the oak-grove near the lake-shore in the southern division of Chicago whenever assurances should be given that suitable buildings would be erected and that the institution would be established upon a permanent basis. The offer was accepted, and on April 2, 1856, the proposed site was conveyed by contract to the Rev. J. C. Burroughs in trust. On Jan. 30, 1857, a charter was granted by the State, naming a board of trustees, of which Judge Douglas was the president and a majority of the members were of the Baptist denomination, to which Mrs. Douglas belonged; but it was added that, "otherwise than that the majority of the trustees and the president of the university shall for ever be of the same religious denomination as the majority of this corporation, no religious test or particular religious profession shall ever be held as a requisite for admission to any department of the university or for election to any professorship or place of honor or emolument in it; but the same shall be open alike to persons of any religious faith or profession." Judge Douglas held the office of president of the board till his death, in June, 1861. Since that time the place has been filled by Hon. Wm. B. Ogden, LL.D., Hon. Thomas Hoyne, LL.D., and N. K. Fairbank.

The university was opened Sept. 29, 1858, with J. C. Burroughs, D.D., LL.D., as the president. He has been succeeded by Lemuel Moss, D.D., Hon. Alonzo Abernethy, and Galusha Anderson, S.T.D.

It has been the aim to make the standard as high as in any American college. Among its professors are Dr. James R. Boise, the author of numerous Greek textbooks; Dr. Wm. Matthews, widely known by his works in English literature; and Prof. Alonzo J. Howe, of the mathematical department. Ladies are admitted to the same advantages as gentlemen in all the classes of the university, The law department was opened Sept. 21, 1858, and the names of Hon. Thomas Hoyne, LL.D., and Hon. Henry Booth, LL.D., are inseparably connected with its history.

The Rush Medical College, at one time a department of the university, is now independent of it. The vicissitudes through which Chicago has passed have materially interfered with the financial prosperity of the university, but during the twenty-four years of its history it has graduated from its literary department about 300 students, and from the law department 800, among whom may be found not a few names which are honored in the political, religious, and business world.

In the year 1865, an astronomical society having been formed, the tower of the Dearborn Observatory was erected by the Hon. J. Y. Scammon. This has been furnished with one of the largest telescopes in the world and with all the necessary apparatus for astronomical work. The director of the observatory gives instruction in that department of the university. (G. A.)

CHICKADEE (*onomat.*), a titmouse, a small oscine passerine bird of the genus *Parus*, sub-family, *Parinæ*, family *Paridæ*. Several distinct species of titmice receive the name "chickadee" in North America, the best known of these being the black-capped (*Parus atricapillus*). This has the crown and nape, with the chin and throat, glossy back, separated by white; the upper parts grayish-ash, the lower white, shaded on the sides with rusty-brown; the wings and tail full slate-color, edged with hoary-whitish, the bill black; the feet leaden-blue. It averages in length 5¼ inches; extent of wings, 8½; wing and tail, each, 2½; tarsus, ¾. It is an abundant and familiar inhabitant of the woodlands of the Eastern United States, especially in New England, the Middle States, and adjoining regions; it is hardy, and resident even in the most severe winters; of active habits and sprightly manners, with the very characteristic note of which the name "chickadee" is an imitation. It is a prolific bird, laying six or eight eggs in a nest constructed with little art, but often with infinite labor, in a natural or artificial excavation on a tree-stump or fence-post, composed of grasses, mosses, hair, fur, feathers, etc., and the eggs are white, fully sprinkled with reddish-brown dots and spots. There are numerous other species of chickadees, both of North America and of the Old World. The former are—*P. a. septentrionalis*, a large variety with a longer tail, the feathers of which and of the wings are more broadly edged with hoary-white; this inhabits the North-western States and the Rocky Mountains. *P. carolinensis* is smaller, with shorter tail and less hoary edgings; of the Southern States. *P. a. occidentalis* is a variety of the first, from the Pacific coast. *P. meridionalis* is a darker-colored species, from the Mexican border and southward. *P. montanus*, of the Rocky Mountains, is distinguished by a white streak over the eye. The foregoing are all very similar to the *P. atricapillus*. The chestnut-backed chickadee, *P. rufescens*, of the Pacific coast region, has the back and sides bright chestnut, the throat sooty, the cap dark wood-brown. In *P. hudsonicus*, so abundant in Northern New England, Canada, and northward, the crown, nape, and back are clear hair-brown, and there are other characters. *P. cinctus*, of Alaska and Siberia, is larger than the foregoing, and otherwise different. The habits of all the species are much the same, and shared to a great extent by other *Parinæ*. (E. C.)

CHICKAHOMINY, a river in the eastern of Virginia which rises on the border of Hanover about 20 miles north-west of Richi l. It south-east nearly parallel with the Ja

it empties about 40 miles south-east of Richmond. It is about 75 miles long, but is navigable only a short distance for small steamboats. During the civil war of 1861–65 the upper part of its course, which is bordered by numerous swamps, served as the innermost natural defence of Richmond, and near it were fought the following battles in McClellan's campaign of 1862: Fair Oaks, May 31; Mechanicsville, June 26; Gaines's Mills, June 27; Savage Station, June 29; Glendale, June 30; Malvern Hill, July 1. Again in Grant's campaign of 1864 the bloody battle of Cold Harbor was fought, June 3, on the same ground as Gaines's Mills. See COLD HARBOR, and other articles on these battles.

CHICKAMAUGA, a post-hamlet of Hamilton county, Tenn., on the Western and Atlantic Railroad, 12 miles east of Chattanooga. It is noted for the scene of one of the bloodiest and most complicated battles of the civil war, fought Sept. 19 and 20, 1863, between the Union army commanded by Gen. W. S. Rosecrans, and the Confederate army under Gen. Braxton Bragg. Chattanooga was for both armies the strategic point of the campaign; success would be with the one which should occupy and hold it.

Chattanooga is a great railroad centre, and stands in the narrow and important gateway from Tennessee into the fertile counties of Georgia. To the south and west the mountains are broken into subordinate ridges, separated by creeks and valleys, which form natural obstacles to an advance on the town from that direction. From west to east the principal among these are: 1. Sand Mountain, the northern extremity of which bears the name of Racoon Ridge; 2. Beyond Lookout Creek is Lookout Mountain, 2400 feet high, but having a practicable terraced base as it declines toward the river; 3. Beyond Rocky Creek is Missionary Ridge through the northern gap of which a road runs to Rossville; 4. South-east of Missionary Ridge and across the West Chickamauga Creek lies Pigeon Mountain. The Chattanooga River, rising above Lafayette, runs northward into the Tennessee at the city. A common watershed for these streams is found in the McLemore's Cove, which forms a great gap through or between the ridges mentioned.

Gen. Rosecrans had remained for months apparently inactive after the battle of Stone River, or Murfreesborough, in which he had defeated Bragg, Jan. 2, 1863. When, at last, June 25, after repeated remonstrances from Gen. Halleck, he began his southern movement, the elements seemed to conspire against him; an incessant rain for seventeen days impeded his advance, and his movements were necessarily slow. His force, called "The Army of the Cumberland," numbered about 60,000 men, divided into three corps, under Gens. Crittenden, Thomas, and McCook. Supporting the army of the Cumberland by a concurrent movement upon Knoxville was a column under Gen. Burnside, of about 20,000. To resist this Federal advance Gen. Bragg had about 50,000 men, posted chiefly at Shelbyville and War Trace, covering gaps and confronting the march of Rosecrans at an average distance of ten miles from Murfreesborough. Buckner was at Knoxville with about 10,000 men. The first scheme of Rose-
ns was to turn the Confederate right. Bragg fell
ra
lly, destroying the bridges and railroads as
ed toward Chattanooga. Thus impeded,
moved very slowly. He crossed the Cum-
ntains August 16, and then spent a month
the communications and concentrating his forces. Again there was a sharp correspondence with Gen. Halleck, in which he was strongly urged to advance.

Meantime, the Confederate government, in the greatest concern lest Bragg should be overpowered, ordered Buckner to abandon Knoxville and East Tennessee and join Bragg without delay. Further reinforcements were sent him with Gen. Polk from Alabama and Longstreet from Virginia, and with this increase of numbers he was told he must fight. He posted Polk in and around Chattanooga, and Hardee on the Knoxville Railroad. Chattanooga, thus strengthened, being too powerful for a direct attack in front, Rosecrans moved his army down the river and crossed below on pontoons, rafts made of boats, and by the bridge at Bridgeport, which had been repaired. The Federal army was then set in motion on the left bank to turn the left flank of the enemy and strike his rear. Crittenden, on the Federal left, moving down the Sequatchie Valley, was ordered at the same time to advance directly upon Chattanooga. McCook, with the right wing, crossing at Caperton and Bridgeport, was instructed to advance through the mountain-passes to Valley Head, and thence by Summerville and Alpine to threaten the enemy's communications at Rome, in Georgia. Thomas, with the centre, was to pass the Racoon, cross the Lookout Mountain by several gaps, and, passing through McLemore's Cove, to march upon Lafayette. Crittenden crossed the river August 20, and on the 21st he shelled Chattanooga. By the 1st of September the entire Union army was across.

Bragg was not for a moment in doubt as to Rosecrans's purposes, nor did he fail to observe that in carrying them out the Union general had injudiciously extended his army. In the presence of a sagacious and wary foe he had separated his three corps by difficult mountains. Determining to take advantage of this, Bragg ordered Gen. D. H. Hill to march upon Lafayette, now the objective point, with the divisions of Buckner and Walker. He withdrew his stores from Chattanooga and abandoned the place because it was untenable, yet hoped to reoccupy it after a battle. He intended to give desperate battle upon the left centre of Rosecrans, hoping to crush him before he could concentrate his forces.

The Union general was in excellent spirits. Crittenden, on Sept. 8, had occupied Chattanooga with one brigade, and had marched the rest of his command to Ringgold, on the railroad between Chattanooga and Dalton, hoping to intercept Buckner, who, however, had already passed him on the way to Lafayette. Thomas was marching to Lafayette, and McCook was still moving in the direction of Rome. Thus, while the Union general thought his enemy was contemplating retreat, he was himself in imminent peril of having his unsupported left and centre crushed by overwhelming numbers.

Bragg had received all available reinforcements, the duty of guarding the railroads and bridges in rear being left to the Georgia militia. The skilful and sagacious plan of Bragg failed from the want of co-operation on the part of his generals; before it could be tried Rosecrans and his commanders had discovered the Confederate purpose and their own error. Thomas, who was still in McLemore's Cove, grasped the situation, and sent word that McCook must make a forced march to close up on his right. In carrying out the new orders, McCook, ignorant of the country lying between Thomas and himself, and that there was a

road over the top of the mountain, was obliged to make a long circuitous route around the rear, which, had the enemy been intending to move in that direction, would have left the right flank of Thomas exposed. Fortunately, however, the closing up on the right was effected by the morning of September 18. It was not a moment too soon. Crittenden, encountering unexpected resistance at Ringgold, had fallen back across the Chickamauga. During the day and night of the 18th all the troops were placed in position. The entire Union army lay on the right bank of the Chickamauga, the right still on McLemore's Cove, and at first the left at Lee and Gordon's mills. During the night the whole force was moved northward by the flank, Thomas, in front, overlapping the left of McCook. Gen. Gordon Granger's command was in reserve in front of Rossville; Crittenden was posted in rear of the centre; the headquarters of Gen. Rosecrans were in rear of the right centre; other reserves were in scattered positions toward Chattanooga. It was now manifest that it was Bragg's purpose, while trying to overwhelm the Union centre, to turn its left and cut Rosecrans off from Chattanooga. The Confederate army lay that night on the left bank of the Chickamauga, Gen. Polk, with Walker's and Cheatham's division on the right, confronting the position of Thomas, and Gen. Hood on the left. With great rapidity Bragg moved 30,000 men across the creek and pushed division after division upon Thomas. The first attack drove in Thomas's advance, but, others coming to the rescue, it was driven back in turn. The attack was renewed with redoubled vigor along Thomas's entire front. The danger seemed imminent, when Gen. Hazen, of Crittenden's corps, rapidly posted twenty guns, and, delivering an enfilading fire, drove back the Confederates in confusion. One more organized attack, but not so vigorous as the preceding, was made upon the Union centre, and was repulsed, when night put an end to the conflict.

New dispositions were made in both armies under cover of the darkness; and when the morning of the 20th dawned, both were ready for battle. In the Union lines McCook, well closed up, still occupied the right, his flank being drawn back *en potence* to resist a movement in that direction; Thomas, well drawn together on the left, had been reinforced by the divisions of Johnson and Palmer of McCook's corps; the divisions of Brannan and Negley were held in reserve. Crittenden was placed in reserve in rear of centre, and Gen. Granger to the left and rear of the whole line, in the direction of Rossville. The cavalry occupied the extreme right. Bragg's army confronted the Union troops from left to right with Polk's corps, Hill, and Longstreet. These were arranged in two lines, with adequate reserves, and with the cavalry on the left. The Union army was on the defensive. Fortunately, Thomas had taken the precaution to throw up slight entrenchments in his front, which proved to be of great service.

Bragg had given orders to attack at sunrise, and was in the saddle with the earliest dawn listening for the sound of Polk's guns. He did not hear them; and when he sent in hot haste to find the reason, he was told that Polk had not passed the night with his command, and that in posting the troops Longstreet's right overlapped him and he could not move until his front was uncovered. This was not accomplished until ten o'clock. Then the whole Confederate right was launched, division after division, upon the devoted Thomas. To meet this, troops were hurried up from the right to reinforce him, and the tide seemed to have turned in his favor, when an unfortunate mistake changed the aspect of affairs. Gen. Wood, on the right centre being explicitly directed to close up to the left on Reynolds, did so, and thus unwittingly left a gap in the Union front, which Longstreet was not slow to perceive. Into this he poured his troops, rolling up the Union right and centre, sending both flying toward Chattanooga and Rossville. Thus Thomas seemed left to his fate, with no possibility of success; and if Thomas were routed, no one could estimate the disaster of the broken army in flight across the Tennessee and void of all elements of reorganization. But help was at hand. The first unlooked-for aid came in the form of Sheridan's division, which, held firmly in hand amid the flying troops, joined the right of Thomas with a defiant front to the enemy, and checked the flank movement. Upon Thomas, thus reinforced, the brunt of a new and more vigorous attack fell; he stood like a rock, and received, as he deserved, the appellation "The Rock of Chickamauga."

With the rapid dispersion of the right and centre McCook and Crittenden had been swept along in the tide of flight, and with them Rosecrans and his staff. Thomas was left to command the field. Far to the rear, disengaging himself from the fugitives, Rosecrans found himself with his chief of staff, Gen. J. A. Garfield, at a crossing of roads, one of which led to Thomas's position and another to Chattanooga. They could still hear the heavy firing. Hoping against hope that Thomas might still hold out, the Union general sent Garfield to join him or to bring tidings of him, while in person he set out for Chattanooga to make the best arrangements for holding it at all hazards.

Meantime, heroic Thomas, slowly falling back to better ground, had been able to repel every attack. In his last position his troops were drawn up in a line curved slightly inward, with its flanks resting upon spurs or slight elevations of Missionary Ridge. Polk was still pounding on his left, and Longstreet on his right. Again there came a critical moment. Another slight opening was made in the Union right, upon which Longstreet rushed as before. But Gordon Granger sent his reserves immediately to reinforce the weak point; the enemy were driven back in confusion, and thus ended their last charge.

Again night came down upon the scene of carnage; the firing ceased. Thomas fell back slowly and in good order to Rossville, leaving, indeed, his dead and wounded on the field, but capturing 500 prisoners in retiring. The next morning, in his new position, he confronted Bragg and offered him battle. The offer was not accepted, although he remained in position throughout the day. On the following night he joined the rest of the army in Chattanooga. It does not appear why Bragg, when urged by his generals, did not continue the fight on the night of the 20th, when there was a brilliant moon and Thomas's tenacity had been tried to the utmost.

It is difficult to characterize this battle. To the Union army, as a whole, it was a great disaster, but to Gen. Thomas it was a victory. In technical terms, the Confederate army had won a victory, but they had lost Chattanooga. Rosecrans was there fortifying it, so that it could only be retaken, if at all, by a painful siege. The Union losses were in all 16,351 men and guns. Unnecessarily great as they seem, they were hardly too great to pay for the prize gained and kept.

The Confederate losses, according to Bragg's report, equalled two-fifths of his entire force.

On the 16th of October, Rosecrans was relieved from the command of the Army of the Cumberland, which was given to Thomas. On the same day Gen. Grant was placed in command of the Departments of the Ohio, the Cumberland, and the Tennessee, all constituting the Military Division of the Mississippi. On the 23d he was at Chattanooga with the mission to defeat Bragg, who was now besieging the town, and to render that stronghold impregnable. See CHATTANOOGA, BATTLE OF. (H. C.)

CHICKASAW INDIANS, a tribe of North American aborigines belonging to the stock known as Appalachian, and allied in language and traditions with the Choctaws and Muscogees, or Creeks. Their language is, in fact, only a marked dialect of the Choctaw tongue. De Soto visited their town of Chicaca in 1540. In colonial times they were seated in what is now the northern part of Mississippi, their country at one time reaching north to the Ohio River. They were, as usual with Indians, divided into clans, or *gentes*. They had a king, or *mico*, besides inferior chiefs. They were often at war with the French colonists, but were almost constantly friends of the English. The formal cession of parts of their country to the whites began in 1805, and somewhat earlier than this the people had begun to remove across the Mississippi, looking for better hunting-grounds. The final cession of their lands took place in 1834. From 1837 to 1855 they were settled with the Choctaws, and formed a part of that nation. But, though they had a large money-annuity from the United States, they did not prosper. Since 1855 they have had a separate tribal organization, and have done much better. Being slaveholders, they sided with the South in the war of 1861–65, and, in consequence, lost a large part of their surplus lands and had their government annuity very greatly reduced, much to their real advantage.

See Vol. V. p. 533 Am. ed. (p. 614 Edin. ed).

The Chickasaws in 1882 were reported to number 6000. They have 7267 square miles of good land. Their country lies west of the Choctaw nation, with which it has a certain alliance; but the Chickasaws are self-governing, having laws and a system of administration based upon that of the various States. Their country lies on the Red River, which divides it from Texas on the south. The tribe is, for its numbers, the most wealthy in the Indian Territory. This wealth has come partly from the practice of hiring white laborers, partly from their former great funds and annuities, partly from their rich soil, and latterly from the facilities afforded by the railway which crosses their lands and has caused the opening of coal-mines, the latter affording a revenue to the tribe.

The Chickasaws have repeatedly asked for a distribution of their lands in severalty, but Choctaw influence has thus far prevented it. The Chickasaws have good schools, including four academies and an orphan asylum. Most of the people can speak English, and a large number are communicants in Christian churches. There are many freedmen among them, who are well treated, but are not adopted as members of the tribe. These negroes are regarded as United States citizens, and their schools are sustained by the United States government.

CHICO, the largest town of Butte co., Cal., is on Chico Creek, 5 miles E. of the Sacramento River and 95 miles N. of Sacramento, on the California and Oregon Railroad. Though laid out in 1860, improvements scarcely began till 1869, owing to the previous uncertainty of title in lands covered by the Spanish grants. Since that time it has improved rapidly, the country around being noted for its beauty, fertility, and salubrity. Large quantities of lumber from the lower hills of the Sierra Nevada are shipped to San Francisco by boat and rail. Chico was incorporated in 1872, and now has gas-works, water-works, and a park. It has three large hotels, two banks, three daily newspapers, four churches, three public schools, an academy, a foundry, two grist-mills, two planing-mills, a sash-and-door factory, carriage-factories, a fruit-canning factory, and some minor works. Population, 2892.

CHICOPEE, a town of Massachusetts, in Hampden county, 4 miles north of Springfield. It is on the Chicopee River, near its junction with the Connecticut River; also on the Connecticut River Railroad, at the junction of the branch, which extends two miles to Chicopee Falls, a village which is under the same town government. Both villages are supplied with water-power by the Chicopee River. There are very extensive manufactures of cotton goods, farm-implements, paper, alpacas, locks, cutlery, machinery, brass and bronze castings, firearms, and other goods. The public school system is well organized and efficient. The town has several churches and schools, a national bank, two savings-banks, a convent, and Catholic parish schools. Population, 11,286.

CHICORY has been naturalized in various parts of the United States. It came originally from the East—probably from Asia; and Pliny mentions that it was cultivated in Egypt. It seems to be a wayside companion of man in his migrations. According to Dodonæus, the eminent German botanist of the sixteenth century, its German name (*Wegwart*) is due to this fact. In Europe its flowers are usually described as blue, but in the United States the white-flowered variety is nearly as common as the other. Near Philadelphia its flowers open about 9 A. M. and close at noon. Its frequency in the vicinity of Philadelphia is ascribed to its cultivation by the early settlers of Germantown and their descendants, though now it is regarded only as a weed. It was cultivated as a salad and for its supposed medicinal virtues, especially in case of ague. Within the past century it has been chiefly used as an adulterant for coffee, but sometimes as an entire substitute. What is used for this purpose is grown to a small extent in the older parts of the United States, but is chiefly imported from Europe. When mixed with coffee it modifies the stimulating effect, but in excess it acts as a diuretic. In 1882, although there was a duty of two cents per pound on chicory, while coffee was free, 1905 tons of chicory was imported into the United States. Even chicory, however, is sometimes adulterated, carrots and various barks being used for this purpose. The analysis of chicory shows the following constituents: Water, 9.09; mineral salts, 4.20; soluble extractive substances, 41.29; soluble gummy resinous substances, 5.22; dextrine, 6.12; saccharine matter, 11.36; cellulose, 19.40; caramel, 2.10; carbon, 1.18; empyreumatic oils, 0.04.

See Vol. V. p. 534 Am. ed. (p. 614 Edin. ed.).

In Europe chicory has found some favor as a forage-plant. In the early part of this century it was introduced into the Southern States as such, but it afterward fell into disuse. It may yet be found serviceable in the drier parts of this country, as cattle are fond of the herbage and its long roots enable it success-

fully to resist periods of drought. Arthur Young, the English agriculturist, in the latter part of the last century cultivated it largely for feeding purposes. It was found to start into growth under a very low temperature, making seven inches in three weeks, and to afford three or four cuttings a year. It is superior in productiveness to lucerne, and even to the alfalfa of the Pacific Slope. In the first year after sowing Young obtained 19 tons 4 cwt., per acre at two cuttings, and in the second year 38 tons 9 cwt., and the same field in four years gave an annual average of 30 tons per acre. The objection to it as a hay-plant in England seems to have been the difficulty of drying its succulent roots in that moist climate—an objection which would be entirely removed in the arid portions of the United States. Some experiments in its cultivation have been made by German farmers in San Joaquin county, California, and about 400 acres are grown there. In good years an acre is said to furnish $300 profit, the root, when dried and ready for market, being worth $200 a ton. (T. M.)

CHIGI, FLAVIO, an Italian cardinal, born at Rome May 31, 1810, of an illustrious family, being a brother of the prince Chigi-Albani. In 1848 he became an officer of the pope's noble guard. In 1856 he was made titular archbishop of Mira, and went to Moscow as papal representative at the coronation of the czar Alexander II. He was afterward apostolic nuncio in Bavaria, and from 1861 to 1873 was nuncio in Paris. In that year he was recalled and made a cardinal-priest. He was also archpriest of the patriarchal archbasilica of the Lateran, a grand prior of the order of St. John of Jerusalem, Latin secretary to pope Leo XIII., and a secretary of memorials, being one of the palatine cardinals. He died Feb. 15, 1885.

The Chigi family of Roman princes is an offshoot of the Sienese house of the same name. Pope Alexander VII. (Fabio Chigi, 1599–1667) planted the Roman branch of the family tree and greatly increased that vast wealth which built the splendid Chigi palace and established the noble Chigi library. The present head of the house, Prince Mario Chigi-Albani, born Nov. 1, 1832, succeeded to his titles in 1877; is hereditary marshal of the Church and guardian of the conclave.

CHILD, SIR JOSIAH, BART. (1630–1699), an English economist, born in London in 1630. He became an eminent merchant and chairman of the East India Company, and was made a baronet by Charles II. His son was the first earl of Tylney. Among his works are *A New Discourse of Trade* (1690; often reprinted); *The East India Trade the most National of all Foreign Trades* (1681); *Observations concerning Trade and the Interest of Money* (1668; subsequently expanded into the "New Discourse," above noticed); *The Interest of England Considered* (1694); *The Relief and Employment of Poor*, etc. He died in London in 1699. He counselled a reduction of the rate of interest to four per cent., the prohibition of the export of wool, the transportation of paupers to the colonies, and reciprocity with those countries which bought English goods and sold to England raw materials.

CHILD, LYDIA MARIA (1802–1880), an American authoress, was born at Medford, Mass., Feb. 11, 1802. Her father, David Francis, was a baker, and removed to Maine while she was a child. Here, as she grew up, she studied with her brother, Rev. Convers Francis, a Unitarian minister, who afterwards became a professor in Cambridge Theological School. In 1824, upon reading an article by Rev. Dr. J. G. Palfrey in which he suggested early New England history as a proper field for a novelist, she rapidly wrote off a chapter, and when this was highly commended by her brother, continued until in six weeks she had completed *Hobomok, an Indian Story*. In the following year she published *The Rebels*, a story of the American Revolution. Prominent historical characters are introduced, and the speeches attributed to them have often been quoted as genuine. In 1826 she commenced *The Juvenile Miscellany*, a monthly magazine, which she edited for eight years. In October, 1828, she was married to Mr. David L. Child, a lawyer of Boston, noted for the boldness with which he denounced social wrongs. She published a book on domestic economy and cookery, called the *American Frugal Housewife*, which has gone through many editions. Turning her attention to education, she prepared *The Mother's Book*, 1831, and *The Girl's Own Book*, 1832. These were followed by lives of several eminent women, as Madame de Staël, Lady Russell, Madame Guyon. To these she afterwards added *Biographies of Good Wives*, 1846, and *History of the Condition of Women in All Ages and Nations*, 1845. When the anti-slavery agitation began, Mrs. Child became interested in the movement, and published *An Appeal in Behalf of that Class of Americans called Africans*, in which she advocated immediate emancipation. This was followed at various times by other anti-slavery writings. In 1841 she and her husband removed to New York to become editors of the *National Anti-Slavery Standard*. While there she also wrote a series of letters to the *Boston Courier*, treating of every-day life in the metropolis and its vicinity, which were afterwards gathered into two volumes under the title *Letters from New York*. They were reprinted in London, and are superior in interest to most of her writings. In 1836 she published *Philothea*, a classical romance of the times of Pericles and Aspasia, which has been highly praised for its artistic reproduction of a bygone age. In 1853 she published the *Life of Isaac T. Hopper*, a noted Quaker of Philadelphia who was prominent in his opposition to slavery. It was published in but a small edition, and, becoming very scarce, was reprinted in 1882. A translation of it was published in Germany. It is one of the best biographies in the language. In 1859, having written a letter of sympathy to John Brown, the emancipator, she became involved in a controversy with some ladies of Virginia, and her letters were extensively circulated. In the *Progress of Religious Ideas*, published in 1855, she treats at length the various religions of the human race; and though her work gives evidence of a wide range of reading, it also shows that she was unable to weigh the authorities for her statements, as many of them are incorrect and misleading. In 1864 she published *Looking towards Sunset*, and in 1867 *The Romance of the Republic*. In 1865 she prepared a compilation called the *Freedman's Book* as a help in the education of the emancipated negroes. She also gave liberally for the support of schools among them, as she had formerly done during the war for the relief of the soldiers. She died at Wayland, Mass., Oct. 20, 1880.

CHILDERS, HUGH CULLING EARDLEY, a statesman, was born in London, June 25, 1827, the only son of Rev. Eardley Childers Yorkshire. He was educated at Trinity C bridge, graduating in 1850. Af same year, he went with his wife to A

in 1851 he became a member of the newly-established government of Victoria. He held in succession charge of the education, immigration, revenue, and finance departments, and displayed in them all remarkable administrative ability. He retained his seat in the executive council for six years, and for two years (1856–57) was the representative of Portland in the Legislative Assembly. He then returned to England as agent-general for the colony, and took part in various commercial enterprises. He also studied law at Lincoln's Inn, but was not called to the bar. After an unsuccessful attempt to enter Parliament in 1859, he was elected as Liberal from Pontefract in 1860, and has since continued to represent that district. His large experience in public affairs led to his appointment on many important committees and royal commissions.

He thus was called to investigate transportation, penal servitude, law courts, and other matters, and his views have since been embodied in statutes. In April, 1864, he was appointed by Lord Palmerston one of the lords of the admiralty. In the next year he was transferred to the position of financial secretary of the treasury, which office he held till the close of that administration, in June, 1866. His activity was by no means confined to his official and parliamentary duties. Besides attending to his commercial enterprises, he found time to write some vigorous pamphlets on national education and other questions of the day. In December, 1868, he entered Mr. Gladstone's cabinet as first lord of the admiralty, but in March, 1871, resigned this position on account of ill-health. During his tenure of office he had effected important changes the tendency of which was to increase the power of the first lord of the admiralty, while rendering the departmental officers individually more responsible. In August, 1872, Mr. Childers was appointed chancellor of the duchy of Lancaster, and his re-election for Pontefract on this occasion is memorable as being the first parliamentary election by ballot in England. A year later, when Mr. Gladstone's cabinet was reconstructed, Mr. Childers retired; but in April, 1880, when the Liberals, after an interval of six years, returned to power, he was appointed secretary of state for war. In December, 1882, Mr. Gladstone felt obliged to relinquish part of his onerous duties, and Mr. Childers was called to succeed him as chancellor of the exchequer.

CHILI (Spanish *Chile*), a republic of South America which occupies the narrow strip of country lying between the Andes and the Pacific Ocean, and extending from the Camarones River, in 19° 12′ 30″ S. lat., to Cape Horn, in lat. 55° 59′. Peru in 1883 ceded the province of Tarapacá to Chili, at the same time assigning two other provinces for ten years, at the end of which time a popular vote is to decide the question as to whether the two provinces N. of Tarapacá are to be Chilian or Peruvian. The boundary treaty made with the Argentine Republic Oct. 22, 1881, terminated a long controversy between the two countries, and gave Chili the greater part of the Terra del Fuego islands and all the Straits of Magellan. The new boundary-line follows the Rio Virginia on the Atlantic (Dungeness Point) to the sun[illegible] of Mount Aymon, [illegible] the Straits of Magellan to the 52d parallel of latitude, which line follows the summit of the Andes to the north-western extremity of the Argentine Republic. In June, 1882, the Chilian administration submitted to Congress a bill making the Camarones River the boundary, thus annexing the rich Peruvian province of Tarapacá and all the sea-coast of Bolivia, which formerly extended from the 24th parallel N. to the Loa River, which separated Bolivia from Peru. The area of Chili, with the additional territory now annexed, is about 300,000 square miles.

See Vol. V. p. 585 Am. ed. (p. 616 Edin. ed.).

Population.—The population of Chili, according to the last census (1875), as given by Mr. Asta-Burnaga, without taking into account the 40,000 Indians, was 2,075,971. Classified by civil state, it is as follows:

Unmarried,	Males,	725,389	Females,	690,469
Married,	"	278,013	"	276,948
Widowers,		30,572	Widows,	74,580

By grade of instruction, as follows (children included):

	Males.	Females.
Able to read	270,908	206,413
" " and write	244,985	176,162
Not able to read or write	518,081	659,422

By nationalities, as follows:	Males.	Females.	Total.
Germans	3,143	1,535	4,678
Argentines	4,560	2,623	7,183
Spaniards	1,102	121	1,223
French	2,408	906	3,314
English	3,459	808	4,267
Italians	1,725	259	1,984
North Americans	821	110	931
Peruvians	470	261	831
From other South American countries	470	209	679
From other European countries	1,211	199	1,410
From Asiatic countries	132	4	136
Total foreign-born	19,500	7,135	26,635
" native-born	1,014,474	1,034,862	2,049,336
Grand total	1,033,974	1,041,997	2,075,971

Provinces and Territories.	Square miles.	Population, Jan. 1, 1880.		
		Male.	Female.	Total.
Territory of Magellan, from lat. 47° to Cape Horn	57,761	746	505	1,251
Chiloe Islands and continent, to lat. 47	38,567	34,341	35,482	69,823
Llanquihue	7,810	27,718	25,782	53,500
Valdivia	7,521	17,669	16,689	34,358
Arauco	8,085	29,550	26,469	86,019
Territory of Angol	2,117	12,084	10,484	22,568
Biobio	4,146	41,808	38,807	80,617
Concepcion	3,382	82,782	84,079	166,861
Ñuble	3,362	67,380	67,459	134,847
Maule	2,771	60,576	63,512	124,088
Linares	3,298	65,738	63,397	129,135
Talca	3,477	56,089	57,516	113,605
Curicó	2,754	50,635	53,010	103,645
Colchagua	3,588	74,927	77,700	152,627
Santiago	7,323	188,574	198,537	387,081
Valparaiso	1,504	90,138	89,949	180,087
Aconcagua	5,886	65,230	68,698	133,928
Coquimbo	12,307	81,315	83,250	164,565
Atacama	48,409	42,122	32,709	74,831
Total	224,068	1 089,400	1,094,034	2,183,434

The total population in September, 1889, was given at 2,665,926, exclusive of 50,000 Indians. This return is regarded as unsatisfactory, the real population being believed to be 3,116,000. The total area between 24° and 44° of latitude being 129,721 square miles, the average density is 24.40 inhabitants per square mile. The Government has appropriated $200,000 annually to encourage foreign immigration. A like attempt some years earlier proved very fortunate in the German colonies of Valdivia, Llanquihue, and Osorno.

Chili is divided into seventeen provinces and three

territories, and has a population with much Indian admixture, yet more purely Spanish than in any other South American country.

The following are the approximate populations of the principal cities: Santiago, the capital, 180,000; Valparaiso, the principal port, 110,000; Talca, 21,000; Concepcion, 20,000; Serena, 14,000; Copiapó, 12,000; Iquique, 9000; Antofogasta, 7000: two-thirds of the people live in the rural districts. The newly-acquired territories are estimated to have something over 60,000 inhabitants, as follows: Antofogasta (Bolivian and foreign), 19,500; Tarapacá (Peruvian and foreign), 42,000.

Tempered continually in its whole extent by ocean-breezes, shut in by high mountain-barriers from the contagious diseases of other countries, occupying the healthiest of zones, and having abundant means of support and all natural resources for hygiene, Chili ought to be the most healthful of lands. But the natural indolence of a large part of the people, the extreme poverty of the masses, and the lack of local precautions neutralize to a great extent these natural advantages. The great mortality among nursing children and the prevalence of small-pox give evidence of this. In Chili only the strongest constitutions attain to manhood and old age; hence there is a notable absence of invalids. The vigor and strength of her laborers, soldiers, and sailors are remarkable.

The republic is intensely unified. This national cohesion is attributable in part to the nature of the territory. There are four entirely distinct powers of government: the executive, invested in a president; the legislative, invested in a national Congress composed of an upper and lower house; the judicial, invested in the various judges of the courts; and the municipal. The president is elected every five years by the people, and since 1871 is not capable of re-election except after an interval of at least one term. He has five ministers or secretaries, and is supported by a council of state composed of eleven members, five of whom are named by the president himself under certain regulations, and the other six are elected by Congress. They hold office for three years. The salary of the president is $18,000 a year. He has also the privilege of residing in the treasury building. The salary of the ministers is $6000 a year. The members of the council of state give their services gratuitously, and are of little consequence, because of the excessive power given to the president. The provinces are governed by *intendentes*, named by the president and removed at his will. Their salary is $4000 a year, with residences. The departments are presided over by governors, named in the same way. The governors are of three classes, according to the salary, which varies from $1000 to $2500. The sub-delegations are presided over by sub-delegates appointed by the governors, and the districts by inspectors appointed by the sub-delegates. The national Congress is composed of two houses, and its members are elected every three years. The senate has 37 members, elected by the provinces, and the house of deputies 108 members, elected by the departments. They give their services gratis, and since 1876 the deputies are elected by the system of cumulative voting devised by John Stuart Mill. The judicial power is vested in the supreme court, composed of six members resident in Santiago, who have no political functions. In 1881 a law was passed declaring the incompatibility of the judicial and legislative functions. The supreme court is occupied chiefly with cases of real estate, war-claims, and criminal cases.

Chili is fortunate in possessing an excellent codification of her laws. The civil code was promulgated in 1858, and the commercial code, penal code, code of mines, code of organization of tribunals, etc., followed in order. The civil code is taken largely from the Code Napoléon, and the military code from the ordinances of Spain. Recently (1882) a rural police has been organized throughout the republic, sustained by a small property-tax.

The religion of the country is Roman Catholic, but Protestantism is tolerated, and in Valparaiso and Santiago there are Protestant congregations having chapels and supporting their own pastors. The state Church has one archbishop, nominated by the president and confirmed by the pope. The archbishop resides at Santiago, and the bishops have their see-houses at Serena, Concepcion, and Ancud. The state assists to maintain the Church in return for the tithes of the fruits of the land, which the Church formerly enjoyed. The archbishop and bishops receive salaries of $6000 a year, and the other revenues of the Church amount annually to $250,000, while the tithes (appropriated by the state since 1850) amount to five times this amount. At present, in consequence of disputes regarding the naming of bishops and archbishop, there is a strong feeling in favor of the separation of Church and State. The clergy of Chili are generally well educated and moral, but they are insufficient in number, although there exists a fine theological seminary in Santiago, and others at Valparaiso, Serena, Concepcion, and Ancud. The whole number of native priests is not over 400, but many come from Spain and Italy.

Public education in Chili is comparatively meagre, but in its higher courses is very thorough. Unfortunately, however, the school system does not adequately provide for the practical needs of the people. It has scarcely recovered from the early Spanish influences, yet it has a strong French tendency, which has affected the literature, tastes, and industry of the country. Fortunately, the excess of the evil has produced a reaction, and the youth are changing from a very general preference for the legal profession to the study of medicine, agriculture, civil and mining engineering, mechanics, etc. Public education is divided into three grades—superior, intermediate, and primary. Santiago is the seat of the National University, which has five faculties. A council of higher public education superintends the higher and intermediate schools of the country. These schools are free, and have their own buildings, apparatus, etc. The principal one is in Santiago, founded in 1813 and called the National Institute. In the provinces these schools take the name of *liceos* or high schools. The university preparatory course in the National Institute had in a recent year 843 students; the intermediate course had 918. In the provinces there were also 2176 intermediate students.

In the capital there are special schools for teachers, agriculture, and manual trades: there is also a military academy, an academy of painting, a conservatory of music, and in Valparaiso a naval academy. In these schools together the number of students maintained by the state is about 5000, including those in the theological seminaries. In the private schools there are as many more.

Primary instruction, which formerly received considerable attention, especially under the energetic administration of Pres. Montt (1851–61), is now somewhat neglected by the State. Benevolent societies supply in part this deficiency. The number of children enrolled in

the public schools in 1887 was 81,362, and the number of schools, 950. The average attendance was 57,000. To this must be added the private and society schools, which numbered 532, with a total enrolment of 27,860 scholars. The total number of public and private schools open this year was 1482, with an average enrolment of 74 scholars. The public school expenses in all grades in a recent year were as follows:

National Institute (university preparatory)	$56,841
" " intermediate	116,784
Provincial high schools	208,777
Normal schools	43,872
Primary schools	385,377
Publication of text-books	30,000
Administration, premiums, etc.	106,195
Total	$947,846

The annual appropriation made by Congress for school purposes is about $1,500,000.

In Santiago is the National Library, founded in 1813. It has more than 60,000 volumes, and has been well arranged according to an improved system. The university, institute, and many private schools, as well as the provincial high schools, have excellent libraries. In Santiago and Valparaiso there are museums of natural history, in Serena and Copiapó museums of mineralogy, and a taste for the fine arts may be cultivated in the many private galleries of paintings.

The regular army of the republic, which never in time of peace exceeded 3500 men, was reduced at the beginning of the late war (1878) to the number of 2700. During the war over 60,000 men were enlisted, and at its close (1884) the army contained about 22,000.

The merchant marine of the republic has been on the increase ever since the war with Spain in 1866. In 1879 it was composed of 106 sailing vessels and 30 steamers. During the first year of the war there was a large decrease, but since then there has been a gradual increase. The coast trade has developed, and some Chilian vessels have even been called into the foreign carrying-trade.

There are five steamship companies doing business on the coast—one of them, the Pacific Steam Navigation Company of England, having one of the largest fleets in the world. Its steamers sail bi-monthly to England by way of the Straits of Magellan, and weekly to Panama. The South American Company of Chili runs steamers as far north as Panama and as far south as Chiloe. The German line runs to Hamburg, and the French line to Havre. The Lota Company employs several steamers in the coal and copper trade.

Chili has in operation about 1500 miles of railroad, and surveys are being made for the speedy construction of some 600 more, one line being intended to extend the central line which runs from Valparaiso and Santiago as far as Valdivia, thus traversing the territory of Araucania. To Chili belongs the first railroad constructed (1850) in South America, that from Caldera to Copiapó. The state railway lines (590 miles) had cost for construction up to 1880 nearly $40,000,000, obtained for the most part from British loans. The Transandine Railroad across the Andes was begun April 5, 1889, and will be finished before 1892. It will meet a similar railroad on the Argentine side, and form a continuous line across the continent. At Santiago and Valparaiso, and from Old San Antonia to the mouth of the Maipú, there are street-railways with a total length of 35 miles. In addition to these there are public roads, kept in repair at Government expense, with a total length of 18,600 miles, and 1600 mule-paths, with a total length of 17,000 miles, which are kept in repair by the municipalities or private individuals or companies. There are also 78 streams, with a total navigable extent of 2800 miles.

The number of post-offices in 1890 was 484, and the Government owns a system of electric telegraph lines. The total length of wire, including some temporary lines used in military operations at the north, was 5700 miles in 1880. A line has since been constructed to Ancud, giving 12 additional offices and 473 miles. There is a private line between Santiago and Valparaiso, and another between these two cities and Buenos Ayres, opened in 1872, and connected with Europe. Altogether, Chili had in operation in 1890, 8345 miles of wire. There is a marine cable to Callao, which has recently been extended to Panama, there connecting with Mexico and the United States.

The commerce of the republic is prosperous, and the country, by reason of its agricultural products and its extraordinary mineral riches, is one of the great markets of the world.

The importation of foreign goods to Chili in 1882 amounted to $50,739,901; in 1889, to $65,450,065. The values of the principal articles in 1882 was as follows: Sugar, $4,229,496; cotton goods, $9,252,549; hardware, $754,909; machines, $292.848; clothing and jewelry, $530,547; miscellaneous, $2,156,796.

The nations which in 1882 sent the largest amounts to Chili were: England, $22,586,495; Germany, $8,975,178; France, $7,776,264; United States, $2,577,992; Argentine Republic, $2,823,304.

The articles and products which Chili exported in 1882 amounted to $69,994,519; in 1889, to $65,963,000. These were principally grain and metals.

The agricultural products exported were: Wheat, $6,649,348; flour, $1,282,806; barley, $120,692; wool, $259,731.

The mineral products exported were: Bar copper, $14,778,333; ingot copper, $2,066,649; silver, $3,909,852; saltpetre, $28,698,364.

The foreign and coast trade showed the following number of vessels in 1882:

	Foreign Trade.		Coast Trade.	
Entered.	No.	Tons.	No.	Tons.
Sailing vessels,	960	623,414	2,277	859,393
Steamers,	522	744,435	4,473	4,389,088
Cleared.				
Sailing vessels,	805	514,721	2,372	888,881
Steamers,	723	906,307	4,341	4,151,852

In Valparaiso the Government has very large bonded warehouses, which cost over $3,000,000. They were intended to be fireproof, but are not so.

Agriculture and mining are the most important industries of the country. Some advancement has also been made in manfactures. There are manufactories of cloth, silks, paper, metal-amalgamation, castings, oil, sugar-refining, carriages, furniture, wool and hemp goods, ceramics, pottery, candles and soap, lumber-sawing, lime and brick, whiskey, wine and beer, steam-boilers, leather, dying, marble-cutting, and many other industries and manual arts and trades.

At the Continental Exhibition held at Buenos Ayres (March to August, 1882) Chili, having had only a month for preparation, competed with great honor, exhibiting her natural productions and manufactures. She received seventeen medals of the first class, some of the second, and many bronze medals and honorable mentions, amounting in all to 117 premiums. The

Chilian products which attracted the most attention in this international exhibit were cloths, ropes, sugar, spirits, and especially wines.

The native timbers exhibited by the National Agricultural Society, one of the most useful institutions of the country, represented 200 different species. In 1827 the Government of France gave a contract for bringing Chilian timber to her navy-yards, and during the colonial days there were built in Talcahuano and Valparaiso vessels of considerable size. But now the Chilian Government buys all her war-vessels in Europe, and only builds launches and flatboats. These launches are sent as far as Peru and Ecuador, manned by only two men, and they generally carry cargoes of wood and lumber.

During the time of the colony, when the public expenses did not exceed $300,000, they were entirely provided for by annual appropriations made by the viceroy of Peru for the support of the army. The total expenses in 1776, under Jáuregui, were $295,277. In 1810, at the time of the emancipation, the revenues had reached $400,000. With the removal of the restrictions on commerce, and the development of agriculture, mining, and other industries, the income quintupled during the last ten years of the war for independence (1816–26). The estimate in 1826, under Pres. Freire, was $1,736,823. In 1836, under Pres. Prieto, the revenues had augmented to $2,321,936; ten years later, in 1846, under Pres. Bulnes, to $3,741,672; and in the next decade, under Pres. Montt (1856), to $5,708,058. Since that epoch, on account of the introduction of railroads, the institution of banks (1855), the introduction of paper money (1878), the development of coal-mining on a large scale, and the cheapening of blasting materials for mines, the incomes have increased rapidly. In 1866 they amounted to $9,079,936; in 1877 to $16,830,000; in 1882 to $39,008,219; and in 1889 to $62,457,930.

Public Debt.—The debt of Chili in 1882 was:

Foreign debt (gold 48 pence to the dollar)	$34,870,000.00
Home debt (gold 35 pence to the dollar, the present rate of exchange)	36,546,384.85
Total	$91,416,384.85
Debt in 1889, total	$87,622,960.00

The circulating capital of Chili, as represented in 1882 by the principal banks, was as follows:

Banks.	Year of organization.	Nominal capital subscribed.	Available capital.		
			Capital paid in.	Reserve fund.	Total.
Valparaiso	1856	20,500,000	5,125,000	600,000	5,725,000
National	1865	16,000,000	4,000,000	500,000	4,500,000
Allanza	.....	.....	.....	.....	.....
Agricola	1868	1,593,600	1,593,600	22,500	1,616,100
Concepcion	1871	1,000,000	400,000	50,600	450,600
Consolidado	.....	.....	.....	.....	.....
Mobiliario	1870	.....	1,125,000	70,000	1,195,000
Union	1878	500,000	216,500	15,000	231,500
A. Edwards & Co	1867	.....	1,500,000	250,000	1,750,000
Matte & Co	1875	.....	1,000,000	.....	1,000,000
Melipilla	1878	60,000	60,000	3,200	63,200
Total		39,653,600	15,020,100	1,511,300	16,531,400

There are also numerous credit, industrial, and mining companies, etc. One of these, the Lota Coal-mining Company, has an annual net profit of $900,000. There are also a loan association and a hypothecating bank, which have made loans of many millions to the landowners and renters.

History since 1876.—The administration of Pres. Aníbal Pinto was chiefly notable for the war into which the country was drawn in 1879 in consequence of a secret treaty made between Peru and Bolivia in 1873. In this long war Chili received no defeats, and gained a prestige which has placed the country, along with the Argentine Republic, at the head of all the Spanish-American countries. The Bolivian port of Antofogasta was occupied Feb. 14, 1879, and some skirmishers were dispersed in a slight engagement at Calama, on the banks of the Loa, on the 23d of the following March. A maritime war was begun, but was without decisive results until the capture of the famous Peruvian iron-clad Huascar, Oct. 8th of the same year. The ocean thus freed from the enemy's vessels, 10,000 Chilian soldiers were landed at Pisagua, a port of Tarapacá, Nov. 2, 1879, and in the battle of San Francisco one half of this force overthrew the allied Peruvian and Bolivian army of 11,000 men. From that day Chili has remained in undisturbed possession of the rich and desirable territory as far north as the Camarones River. After these victories the operations of the army were retarded by hopes of peace, but it became necessary to undertake a second campaign against the provinces of Moquegua and Tacna, which resulted in the bloody battle of Tacna, in which the allies were again defeated, May 26, 1880. The port of Arica was taken by assault on the 7th of the following June; and, although it would have been easy to carry the victory into unarmed and panic-stricken Lima, new negotiations of peace were entered upon, which protracted the campaign through eight months more. At the end of December, 1880, 25,000 Chilians set sail in three divisions from Arica. They occupied the valley of the Luriu strategically to the end of this month. They then undertook the assault of the formidable works, which were defended by 30,000 men and 200 cannon and protected Lima. On Jan. 17, 1881, they victoriously entered that capital, after having annihilated both the army and the fleet on the 13th and 15th in the bloody battles of San Juan, Chorillos, and Miraflores.

These three campaigns of Antofogasta, Tacna, and Lima brought about ten battles, besides several minor encounters, and cost the army and navy of Chili 10,000 men in killed and wounded. The total extinction of the military power of Peru should have produced immediate peace after the decisive battles which took place at Lima. But a generous policy on the part of Chili, and the unreasonable and unwarranted interference of outside parties, caused the war to be prolonged, thus imposing heavy expense of money and life on Chili, without bettering in the least the condition of the allies. In 1883, Bolivia conceded the Chilian claims to the full. In July of that year Chili gained important military successes, and in the same month the cessation of hostilities was announced. A treaty of peace with Peru was ratified and exchanged in March, 1884, and later one with Bolivia. In January, 1891, a revolutionary outbreak against the administration of President Balmaceda began, which seems to be strongly supported and to be making threatening progress.

(B. V. M.)

CHILLICOTHE, the county-seat of Livingston co., Mo., is finely situated on a high prairie near the Grand River, and at the junction of the Hannibal and St. Joseph Railroad with the Wabash, St. Louis, and Pacific Railroad, 136 miles W. of Quincy, Ill., and 76 miles E. of St. Joseph. It has a fine city-hall, four hotels, two banks, two daily and three weekly newspapers, nine churches, a public school whose building cost $35,000, and a Catholic convent and school. The

industries comprise three flour-mills, a foundry, a broom-factory, tobacco-factory, etc. It was settled in 1837, and is incorporated as a city. Coal is found in the vicinity. The population numbers about 6500.

CHILLICOTHE, a city, the county-seat of Ross co., O., finely situated between the Scioto River and Paint Creek, 45 miles south of Columbus. It is on the Ohio and Erie Canal, and on three railways—the Cincinnati, Washington, and Baltimore, the Scioto Valley, and the Toledo, Cincinnati, and St. Louis Railroad. It is handsomely and regularly laid out, with macadamized and well-shaded streets. It has a fine stone court-house, a handsome city-hall, an admirable system of public schools, public gas and water-works, three national banks (aggregate capital $750,000), five weekly papers (one German), fifteen churches, and a very active trade. There are five roller-process flour-mills, three large tanneries, extensive planing-mills, paper-mills, railway-shops, a foundry and machine-works, three carriage-factories, two breweries, a shoe-factory, and also manufactories of sewing-machines, household utensils, etc. The valuation (one-third of market value) of real property is $2,975,260. There is no city debt. Near the city is a large and beautiful cemetery. Chillicothe was founded in 1796 by Gen. Nathaniel Massie. It was the capital of the Northwest Territory 1800–03, and capital of the State of Ohio, 1803–10, and again 1812–17. Population, 11,256.

See Vol. V. p. 543 Am. ed. (p. 424 Edin. ed.).

CHILLON, a castle and former state prison of Switzerland, canton of Vaud, built on a rock in the Lake of Geneva, near its eastern end, and six miles south-east of Vevay. A wooden drawbridge connects it with the shore. Amadeus IV. of Savoy is said to have built it in 1238, but some authors say, with probable truth, that it was built as early as 1120. Bonnivard, "the prisoner of Chillon," was here confined six years (1530–36) by Charles III., duke of Savoy, surnamed "the Good." Chillon was strengthened and made a fortress by Peter of Savoy ("the Little Charlemagne") in 1248. After its capture and plunder by the Bernese, in 1536, and the liberation of Bonnivard, it became the residence of the grand-bailiff of the canton. It was a state prison 1733–98, and during the present century it has been used as a cantonal magazine for army stores and as a military prison. The story, made famous by Byron, that Bonnivard was here chained to a pillar is entirely without evidence, though pillar, chain, and the track of the prisoner worn in the stone floor are still shown to tourists.

CHIMNEY (Old French *cheminée*, from Latin *caminus*, "a fireplace") is a passage or funnel for the creation of a draught to carry off smoke and other offensive products of combustion from a fireplace. The ancients had no chimneys in their houses. Their living-rooms were heated by either a charcoal brazier, like that still used in the South of Europe, or by an expensive arrangement of hot-air tubes which conveyed the heat from the fire into an adjoining room, or by an open hearth-fire, whose smoke was diffused through the room. We find Vitruvius warning his readers against placing carvings in wood in a room that contains a fire, for the reason that the smoke will ruin them. The last method of heating, therefore, was the most usual, and it is said to have given its name to the Roman *atrium*, or hall ("black room"). The houses of the earlier Middle Ages—the English *hall*, the Old Scandinavian *skali*, the Old German *sal*, the Old French *salle*—all seem to have been heated by the open hearth-fire placed at the middle of the room, from which the smoke rose freely to the lofty and open space under the roof, whence it escaped in part through openings made for that purpose, and also for the purpose of illumination. These openings were closed by a shutter in bad weather.

The first approach to a chimney was forced upon the residents of some parts of Northern Europe by the scarcity of fuel. The open hearth-fire was exceedingly wasteful in this respect, while it promoted sociability by its cheerful glow and kept up a certain democratic equality among all the dwellers in the house by their use of a common fireplace. Around it the old sagas and romantic tales were told, and the traditional songs of the Northern people were sung, long before the means and the knowledge necessary to commit either to writing were in possession of our forefathers. In the absence of any plan for ventilation, the antiseptic properties of the smoke served a useful purpose. But in regions not heavily wooded the consumption of fuel was exhaustive of the supply. The communities which dwelt on the sea-coast and lived by fishing would be the first to feel this, and to look about for some fuel-saving device. The first they hit upon shows that it was not the inconvenience from the smoke which suggested the change. It was a structure of rude masonry, not unlike an old-fashioned "Dutch oven," in which the fire was placed on an elevated hearth, while the smoke escaped into the room, as before, through an opening in the top. By this arrangement the heat was economized through the whole structure being heated when the fire was first started, and its continuing to radiate this heat after the fire had been extinguished. The earliest mention of this device is in the saga which contains the history of Olaf Kyrre, a king of Norway contemporary with William the Conqueror in England. The next step was to lengthen the aperture at the top of this structure until it reached the opening in the roof, and thus to secure a complete escape of the smoke and a measure of safety from the danger of firing the house. When or where this improvement was first made we have no exact information; it seems most likely that it was effected in France about the year 1170. The terms used to designate the new invention are French, not only in Normanized England, but throughout the North of Europe. The oldest instances of chimneys approaching the modern form are in France, and date from the last quarter of the twelfth century. Although the invention seems to have spread with some rapidity among the wealthy classes in Northern Europe and in the cities, it did not supersede entirely the open hearth-fire among the peasantry and small farmers until a very recent time. At the close of last century the earlier arrangement was still to be found in parts of England, and still later in the Orkneys and Shetlands. Even in England chimneys were not common before the end of the fifteenth and the beginning of the sixteenth century.

The invention of the chimney brought about a social revolution in the direction of deepening the distinction between master and man, between rich and poor. It made the intercourse between them less constant and more formal than when all sat by one fire, ate at one table, and slept, if not in one room, at least in recesses from that one room. It deprived the lower classes of much that had been refining in the intercourse of the common hall, and left them to their own mental and social resources. But it made the privacy and refinement of the life of the true family, as distinguished from the

larger and more artificial group of the old hall possible to a degree not before thought of. It led to breaking up the hall into a large number of smaller rooms on different stories, each of which had its separate use. It led to the substitution of windows in the walls for lighting apertures in the roof. In fine, it transformed the old hall, where a large group lived almost or altogether in one large room, into the modern home of the modern family.

The principle of the chimney is simple. A column of heated air is lighter than a similar column of cooler air. Other conditions being the same, a high chimney will have a better draught than a low one. A straight flue will draw better than a tortuous one. By pinching or contracting any part of a flue we can obviously intensify the speed of the ascending draught of air at the point of contraction. In this way Count Rumford cured hundreds of smoky chimneys—by making the throat of the flue small, and thus making the draught at that point so strong that downward blasts of wind failed to overcome it. Chimneys frequently smoke because they are overtopped by neighboring buildings, which at times deflect the wind and drive it down their flues. The most obvious cure for such chimneys is to build them higher. Defective ventilation in a room will sometimes compel chimneys to smoke, since a draught is thereby rendered impossible. It is found in practice that it is better to have the air enter a room from a point opposite the fireplace; for if it came in beside the fireplace there may be generated such a strong circulation of air-currents about the room as at times greatly to enfeeble the chimney-draught. A great variety of cowls and chimney-tops have been devised for curing smoky flues, but most of them are worthless. Espy's is the best, and works admirably.

There are chimneys which rank among the loftiest structures in the world. One at Port Dundas, Glasgow, is 454 feet high, or 458 feet above the foundation. At Manchester, England, there is a chimney 415 feet high. A celebrated chimney-stack at Lochee, near Dundee, is in the campanile style, built of parti-colored brick and stone; it is 282 feet high. Wrought-iron chimneys are often built, but unless well lined with brick they are faulty, since their contained air cools off too readily. Where wood or soft coal is burned, soot collects rapidly in narrow or tortuous flues. For the removal of this substance machines have been invented, and these have to a great extent superseded the labors of the old-time chimney-sweeps.

A good account of the development of the house will be found in Prof. Troels Lund's work *Das Tägliche Leben in Skandinavien während des Sechzehnten Jahrhunderts* (Kopenhagen, 1882). Prof. Lund has made large use of the investigations of the late Rev. Eilert Sundt, who examined the old houses in every part of Norway and published the results in his *Afskellige Bygninqs-skikken in Norge* (Christiania, 1861). The literature of chimney-draughts is rather important. A paper of Count Rumford's, to be found in vol. i. of his *Essays*, is very noteworthy. Several later discussions on the subject occur in the *Journal* of the Franklin Institute. (R. E. T.)

CHINA. Since the suppression of the Tai-Ping rebellion, in 1864, the control of affairs, so far as the imperial authority extends, has been chiefly in the hands of Li Hung Chang, the successful general of that war. Although nominally no more than the first member of the Neko, or imperial council, he has been virtually the mayor of the palace, enjoying the support of the two dowager-empresses, who, except in the interval February, 1873, to January, 1875, have been regents since the death of the emperor Heen Fung, in 1861. Tung Chê, his only son, who succeeded him, died in his eighteenth year, in 1875, and was in turn succeeded by his infant cousin, Tsaitien, surnamed Kwang-Seu, son of Prince Chun, born in 1871. The elder of the two empresses, Tsze-An, died in 1881, but the other, Tsze-Hi, still survives, and supports Li Hung Chang's authority. The Mantchu princes of the royal house are said to resent the pre-eminence of a soldier who has no pedigree to sanction his honors, and to have been intriguing with the patriotic or war party for his overthrow. The effect of this internal struggle upon the foreign policy of the empire has been to make China more jealous of her dignity and more ready for war in its vindication. Much attention has been given to military matters. Camps of instruction have been created to impart European discipline to the troops; the capital has been made impregnable and the coast-line strengthened by forts constructed on scientific principles, and a fleet secured, chiefly of swift gunboats, for defensive service in the shallow waters of the Yellow Sea. Several powerful cruisers have been built to Chinese order in English and German dockyards, but the empire now possesses well-appointed navy-yards and arsenals of its own. The army is said to number 1,200,000 men, but to save the expense of maintaining so large a force in time of peace a part only is in service and under discipline at one time.

See Vol. V. p. 511 Am. ed. (p. 626 Edin. ed.).

Diplomatic Relations.—The long-standing dispute with Japan as to the sovereignty of the Loo Choo (or Riu Kiu) Islands is still unsettled. China follows a policy of delay. In the mean time, the islands remain under Japanese control and administration, and form effectively an integral portion of the Japanese empire, and the Chinese government makes no serious opposition to this state of affairs. Relations with Japan are further complicated by the claims of China to the suzerainty of the Corea; and in the recent treaties made between Corea and the other countries, at the instance of China, some recognition of the claims of the Pekin government has been inserted, to the great indignation of the Japanese. Cora has since moved steadily forward to independance. The movement has been directed chiefly by Mr. Denny, an American who became "Foreign Adviser to the King" in 1885. His wisdom has released Corea from vassalage.

The story of the Kuldja province is curious. In the uprising of the Moslems of Kashgar, on the western borders of the Chinese empire, this frontier province shared to an extent which threatened the peace of the adjacent province under Russian rule, inhabited by Kirghese Moslems. In 1871, Russia occupied Kuldja, with the acquiescence of China, for the preservation of order. On the suppression of the rebellion, in 1877, the return of the province to China was asked, but delayed. After some negotiation a treaty was made at St. Petersburg (September, 1879), by which Western Kuldja was ceded definitely to Russia for a payment of 5,000,000 rubles. This treaty caused great excitement among the patriotic party in China, but the government of the regency refused to approve it, and punished Chung How, the envoy, severely. The prospect of a war seemed imminent, but the warlike spirit was somewhat checked by an edict—following a precedent set by the emperor Heen Fung—which involved those who advised war in loss of their estates in case of a defeat. Negotiations were resumed, and (February 2, 1881) resulted in the restoration of the province

o China, with the exception of a small district in the orth-west, to which those of the inhabitants who pre- er Russian rule are allowed to migrate. On the other and, China paid the costs of occupation (9,000,000 ubles) and granted some privileges to Russian trade on er frontier. The new boundary begins at the Bedshin- r Mountains, and follows the course of the Chargoss ver to its junction with the Ili, and then crosses the to the Usuntan Mountains, leaving the town of Koljak on the left. This, with the contemporary ces- ion of a larger district in the Irtysh, reduces the Chinese area by 35,450 square kilometres.

With France, China has been involved in diplomatic omplications through the French conquest of Cochin- China from the empire of Annam in 1858–59. China as claimed a suzerainty over the Annamese since as ell as before their revolt in the tenth century; but he treaty of 1862, which concluded the conquest, never eceived sanction from Pekin. The comparative in- lifference to what was happening on the southern order ceased when it was found that France was pre- aring to extend her authority over the province of Tonquin, which lies on the seaboard between Cochin- na and the southern provinces of China. The ity of Annam in Tonquin, outside the few large largely nominal; it is inhabited by half-inde- tribes and infested by Chinese outlaws (Yellow nd Flags), the remnants of the Tai-Ping rebel- ion. The population is estimated at 10,000,000. It as explored in 1870 by Jean Dupuis, a French adven- urer, who went thither under Chinese auspices, and who in 1872 fitted out in France a filibustering expedi- ion for its conquest. With a small fleet he penetrated to he capital, Hanoï, and drove the Annamese garrison nto the citadel, and, refusing offers from the Chinese, to invite the French in Cochin-China to take n of the province. The invitation was the citadel taken by storm, and the Ton- quin accepted very generally the French rule. But a new French governor abandoned the conquest, and by he treaty of 1874, in return for concessions in Cochin- China, recognized the rights of Annam over Tonquin, while he drove Dupuis from the country. The attempt of another French governor of Cochin-China to set aside the treaty of 1874 and resume the occupation ed China to put forward her claims to the suzerainty of Tonquin, as Annam is a vassal state of the Chinese mpire. Unwillingness to have France on the frontier of the three southern provinces of China contributed to this purpose, and once more the war-party made use of the situation to force the regency and its trusted eneral to follow a vigorous line of policy. Yet China asked little more than recognition of her rights. She ling to recognize the treaty of 1862 and to the revision of that of 1874, or to sanction its rev n after Annam and France have concluded their negu , but not to admit the competence of An- to alienate territory which belongs to the Celestial , nor of France to make acquisitions which will by the authority of her vassal in a province so d. France, in defiance of her protests, pro- ed (1883–4) with the conquest of Tonquin, taking its three great fortresses by force of arms. The in- action of the imperial government was blamed upon Prince Kung, who was removed from the council. By the treaty of Tien-Tsin, in 1885, China recognized the Fr control of Annam.

of China with the United States have d by a new treaty negotiated by Hon. James B. Angell in 1881, revising that of 1868, negotiated by Hon. Anson Burlingame as the envoy of China. In the new treaty each party had a special purpose in view. America aimed at securing the right to restrict the immigration of unskilled Chinese labor into the United States, in the belief that the current introduction of coolies was, in the language of Mr. Garfield, rather an importation than an immigration, and that it had the effect of displacing white labor and of reducing white workmen's wages to a level below the natural and proper rate. The Pekin government agreed to concede the right of restriction for a reasonable period, with the reservation of free ingress for Chinese scholars, merchants, and the like. On the other hand, China embraced this opportunity as a first step to securing the recognition of her full autonomy in the matter of the regulation of commerce, and especially of the trade in opium. It was agreed that no opium should be carried into Chinese ports by American merchants or in American ships, and that our merchants should comply with the laws enacted by China for the government regulation of commerce in her own ports. This treaty was followed by a demand for the revision of the treaties of commerce with the United Kingdom and other European countries. The demand that England shall recede from her claim of right to send East Indian opium into China is supported by a powerful body of philanthropic opinion in Great Britain. Further attempts at treaty-making have been complicated and rendered abortive by the harsh measures for the exclusion of Mongolians adopted by Congress in 1888, on the demand of the people of California. In spite of the provocation the Chinese government has acted with great moderation.

In 1886 three high officials were sent as a commission to investigate the condition of Chinese immigrants in foreign countries. This commission visited various parts of the East Indies and found the laborers in general treated badly, though merchants were often thriving. They recommended the appointment of Chinese consuls and consuls-general in several places. To this the British and Dutch partially assented while the Spanish government refused. European powers in 1857 had obtained the right to appoint consuls in China but granted China no corresponding right, because the need of such officials was not anticipated.

Statistics.—The area of the Chinese empire is estimated to be 11,767,853 square kilometres; that of China proper, 4,024,690 square kilometres. The population is estimated at 379,700,000 for the empire, and 350,000,000 for China itself. These figures exclude Annam, but include Corea. They cannot be regarded as more than distantly approximative to the truth. A proper census of China never has been taken, and what profess to have been such are mutually destructive. Mr. Hippesley of Shanghai estimates the population in 1876 at 250,000,000. The estimates made by Europeans have been based too often on observation of the densely-peopled provinces of the seaboard, while travellers who have penetrated the interior are unanimous in the report that the inland population is sparse. Three bad harvests in succession in the northern provinces in 1876–78 produced a famine affecting the whole province of Shanse and parts of Chili, Shantang, Honan, and Szechuen; 60,000,000 people are said to have suffered, and 5,000,000 to have perished by starvation.

As the government publishes no budget of expenses, we have nothing but the estimates of European observers as to the income and outlay. Mr. A. E. Hip-

pesley estimated the revenue for 1875 at 79,500,000 taels (the tael being worth about $1.17). Of this amount 18,000,000 was from land-tax paid mostly in kind, 5,000,000 from the monopoly of salt, 7,000,000 from the sale of dignities, and 35,000,000 from taxes on foreign and domestic commerce. For 1881 the duties on exports were 8,329,668 taels: on imports, 5,002,011; tonnage, transit, and similar charges, 1,352,483. The rates of the import and export duties are defined in the treaties of commerce, as is the right of foreign merchants to carry goods which they really own, and which have paid those duties, out of or into any part of the empire without paying internal transport (likin) duties. The liability of such goods to pay likin duties, if transported farther than specified at the time of their importation, is a matter of dispute between China and the foreign merchants. These likin duties furnish a fourth of the revenue.

The foreign commerce of China is still confined to the treaty-ports, now twenty-two in number. Kiungchow was opened in April, 1876; Itchang, Wuhu, Wênchow, and Pakhoi, in April, 1877. The aggregate values in taels are as follows:

Year.	Exports.	Imports.
1866	80,550,512	70,269,574
1877	67,445,502	73,233,876
1878	67,172,179	70,804,027
1880	77,883,587	79,293,452
1881	72,452,974	91,910,377
1887	102,263,669	85,860,208

The exclusion of opium would turn the balance of trade heavily in favor of China, in spite of a vicious system of existing duties, which taxes exports more heavily than imports, the chief of the former being tea and raw silks. The effect of these duties has been to stimulate their production in other quarters, until one-third of the tea consumed in Great Britain comes from India. In 1881 opium was imported to the value of 37,592,000 taels; cotton goods, 26,046,000; linen goods, 5,584,000; metallic goods, 4,829,000; miscellaneous, 17,590,000. The exports were: tea, 32,776,000 taels; silks and raw silk, 26,868,000; sugar, 2,584,000; miscellaneous, 9,225,000, every important article showing a decrease. As a consequence of this dependence upon foreign countries for textile and metallic wares, there is no increase of employment for the people proportional to the increase of population, and China is falling to a lower industrial level through the want of variety in her industries.

By far the greater part of the foreign commerce is in the hands of Great Britain and her dependencies in the East. American exports to China and Hong Kong in the year 1882 were valued at $9,123,000; our imports at $22,638,433; British exports for the year 1881, at £6,234,003; imports at £10,701,645.

The carrying-trade is also largely controlled by foreigners, but the Chinese are taking steps to make the coasting trade their own by purchasing ships of English and American build, especially steamships of light draught. In 1873 they owned but 344 such ships; in 1887, 6402. For the use of their steamers they first tried to work the coal-deposits in the island of Formosa, but the quality proved very poor. At Kaiping, a short distance from Tientsing, deposits of coal equal to the best in Europe have been found, and in 1881 a native company was mining 500 tons a day. Within easy reach lie great beds of magnetic iron ore, said to yield 50 per cent. of pure iron, and these the some company intended to work. They carried their coal to the seacoast by tram-cars drawn by horses, but this slow method has recently been replaced by railroad carriage. Baron von Richthofen estimates the area of coal-beds at 200,000 square miles.

Domestic commerce in China, when there is not a river or canal at hand, is carried on by beasts of burden. Heretofore, the construction of railroads has been discouraged, lest the amount of employment for human muscle should be diminished, and lest the little family cemeteries which are strewn over the whole country should be disturbed to make room for the lines. In July, 1876, an English company began the construction of a railroad from Shanghai to Wusum, its outer harbor, on ground purchased for the purpose, and without permission from the government. The local authorities bought up the railroad at a handsome price, and stopped traffic the next year. The rails were taken up and transferred to Formosa. But the famine and the necessity of military strategy have combined to convince the governmental authorities of the necessity of railroads for China, and extensive plans for their construction have been considered. A railroad has been constructed from the coal mining region to the banks of the Peiho River, its use being restricted to coal carriage. A road 81 miles long, from Tientsin to Toagshan, is open to passenger travel. Several other lines have been authorized. Telegraphs have been recently permitted, and there are now about 3000 miles in operation. The peculiarity of the language has compelled the use of numbers to represent words in telegraphic despatches.

This admission of railroad and telegraph facilities is in consonance with the recent disposition of China to avail itself of the advantages of Western civilization. The army is being reorganized on the European model, and a powerful navy has been acquired, including 3 iron-clads, 35 iron-clad gunboats, 7 cruisers, 9 torpedo vessels, built in England and Germany, and about 100 other vessels. Schools have been founded for the education of young men in foreign languages and the various applications of Western science. Machinery for cotton manufacture and paper-making has been imported. Foreigners have been employed in the arsenals, and in the army and navy. In these and other directions China is showing a disposition to take advantage of the results of Western methods and industries. Recently it has had serious disasters to deal with. In 1888 and again in 1889 destructive floods visited Northern China, the Yellow River overflowing its banks, and depriving 1,500,000 people of a livelihood. To this must be added serious inundations in Manchuria, and a failure of crops over a wide district, from which 10,000,000 people suffered. The inundations are in great part due to a long-continued destruction of the Chinese forests, and it is likely that they will give rise to an effort to restore the forests at the sources of the streams, in this, too, following the teachings of Western science. In short, China, after holding aloof, is beginning to appreciate the value of the arts and sciences of the "outer barbarians," and hereafter great industrial advance may be looked for.

To the French still belongs the honor of pre-eminence in the study of Chinese literature and history. But the most recent contribution to our knowledge of the empire is Baron Karl von Richthofen's *China, Ergebnisse eigener Reisen und darauf gegründeter Studien*, of which vols. i., ii., and iv. have appeared (Berlin, 1877–83). W. F. Mayers's *Chinese Reader's Manual* (Shanghai, 1874) is a valuable epitome of the history and literature of the empire. See also A. E. Hi-

's *China: A Geographical, Statistical, and Political* ... (Shanghai, 1877); J. H. Gray's *China: A History of Laws, Manners, and Customs of the People*, in two vols. ...don, 1878); Playfair's *Towns and Cities of China; A ...ical Dictionary* (London, 1880); Gill's *The River of ... and* (London, 1880); Joseph Edkins's *Religion in China* (London, 1877); George F. Seward's *Chinese Immigration in its Social and Economical Aspect* (New York, 1881), and Dr. S. Wells Williams's *The Middle Kingdom*, 2d edition, New York, 1883). (R. E. T.)

CHINA GRASS. See GRASSES.

CHINCH-BUG (*Blissus leucopterus*, Say). This ...an insect of a length usually not exceeding ·15 of ... inch, its width being less than one-half its length. ... rounded on the under side and flat above, of a ... k color, with white wings which have a trian... ...ack dot on their outer margins. It belongs to ...order HEMIPTERA and sub-order *Heteroptera*, to which group also belongs the common bed-bug. This species, like all of the order, has the mouth prolonged into a slender, horny, jointed beak, usually turned ... the breast when not in use. With this instru..., and with the slender needle-like setæ enclosed ...within it, the insect punctures the bark, leaves, and ... of plants and sucks out their juices. As it has ... means of gnawing plants, and is so diminutive in ..., it would appear to be incapable of inflicting any serious injury on vegetation, but what it lacks in ...vidual capacity is made up by the immense numbers which are occasionally developed. A myriad ... pumps incessantly drawing away the juices of a ... m... in a short time cause it to decay and die. ... ...—as, for example, in 1881—the number has ... great that an entire stalk of corn was often ... covered with them.

...Although the insect was known long before 1831, ... not until that year that it was scientifically ... by Mr. Say, who "took a single specimen ... Eastern Shore of Virginia" and named it ... *leucopterus*. Nineteen years afterwards, Dr. ... ...aron, not aware that the species had previously ... described, named it *Rhyparochromus devastator*, gave the following description: "Length 1⅛ lines, ... of an inch. Body black, clothed with a very ... gray... down not distinctly visible to the naked ... ...oint of the antennæ honey-yellow; second ... , tipped with black; third and fourth joints black; beak brown; wings and wing-cases white; the latter are black at their insertion, and have near the middle two short, irregular black lines and a conspicuous black marginal spot; legs dark honey-yellow; terminal joint of the feet and the claws black."

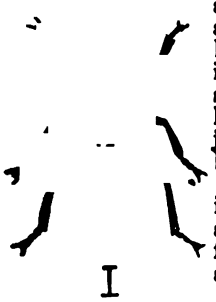


FIG. 1.—Chinch-bug: the line below shows the natural length.

The distinguishing characteristic of the preparatory states is a red color of the abdomen, which finally disappears as the insect approaches the perfect state.

The *egg* (fig. 2, *a* and *b*) is about ·03 of an inch long, elongate oval, at first of a pearly white, but it soon changes to an amber color, and at length shows the red parts of the embryo. The appearance in the larval stages is well shown in fig. 2, *c-f*. In the first stage (fig. 2, *c*) the red pervades all except the front part of the body.

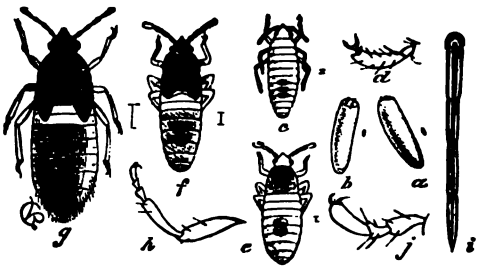


FIG. 2.—Chinch-bug larva, pupa, and egg. *a* and *b*, eggs; *c*, young larva; *d*, tarsus of same; *e*, larva after first moult; *f*, larva after second moult; *g*, pupa; *h*, leg; *i*, the beak or tubular mouth; *j*, tarsus of mature bug.

After the first moult (fig. 2, *f*) the thorax is dark or dusky, and the red of the abdomen duller.

In the *pupa* (fig. 2, *g*) the head and thorax assume a brownish-black color, and the abdomen an ash-brown or gray.

There are two broods annually. Insects of the autumnal brood, having hibernated in the perfect or imago state, come forth in the spring and deposit their eggs on the wheat-stalks at or just below the surface of the ground. The insects produced from these eggs form the first brood. Having reached the perfect state before the females deposit their eggs, they usually leave their original quarters and migrate, for about this time the wheat becomes dry and hard and ceases to furnish them with food. They sometimes fly at this time, but the much more common method of migrating is by marching along the surface of the ground. In those regions where corn (maize) is cultivated it is frequently attacked. Since the number of stalks to a given area is much less than in the wheat-field, the forces are concentrated, and each stalk of corn receives the chinch-bugs of perhaps a hundred wheat-stalks. When the insects are numerous the effect is soon visible.

In all such movements both mature and immature individuals will be observed. In some instances the numbers are so great that not only is the surface of the ground literally covered, but they are piled on each other. If the insects are disposed to fly, which is not often the case, it sometimes becomes necessary to protect the nostrils of the horses at work in the fields. Those who have never witnessed a movement of this kind have a very faint idea of the immense numbers of these insects in a single field of wheat.

Their migrations on foot seldom extend to a greater distance than 80 or 100 rods. When cold weather comes on those of the fall brood leave the now dry and hardened cornstalks and seek secure places in which to remain during the winter. Occasionally they take flight at this time, but usually they seek the most secure places which can be found in and immediately around the field. Corn-shocks, straw-piles, stumps, logs, and fence-rows are used as hiding-places; they even hide beneath the clods and stones when no better places can be found. But many move into the forest or grove if either happens to be near at hand. Sheds, barns, rail fences, and stacks often furnish them with winter quarters. In timbered sections they seek shelter under the leaves and in the crevices of the bark of trees. During the winter they remain in a torpid or semi-torpid state, but are easily warmed into life and activity. As the cold weather becomes more and more

severe they press deeper and deeper, if possible, into the inner recesses of their hiding-places. They prefer dry quarters.

A careful study of their history, and a comparison of the meteorological conditions during and immediately preceding their visitations during the past forty years, have resulted in bringing to light the following laws relating to their increase and diminution: (1) That a more than ordinarily dry and warm season is favorable to their increase, while, on the other hand, more than ordinarily moist or rainy weather is destructive to them; (2) that they never appear in destructive numbers, as in 1871 and 1874, except there have been two dry seasons in succession, and the latter above medium temperature. Even with these conditions fulfilled, excessive multiplication may be prevented by an unfavorable intervening winter. Excessive cold does not appear to materially affect them if there is uniformity; a changeable winter, in which there are warm spells with rains, followed suddenly by cold, freezing weather, is most destructive. The eggs are more easily affected by meteorological conditions than the young or perfect insects, and are destroyed by heavy rains. If compelled to deposit all their eggs at one time, an entire brood might be destroyed by a single drenching rain, but the female deposits a few eggs daily, the process being carried on for two or even three weeks.

The eggs of the spring brood usually hatch out in 15 or 16 days. The young commence almost immediately after they leave the eggs to pump the sap of the plant on which they find themselves—a work they continue without cessation through all their stages of growth as larva, pupa, and imago. The consequence is, that they grow rapidly and moult often, undergoing four of these changes during five or six weeks. The length of life from the time they are hatched until they reach maturity is usually from five to seven weeks; from the time the egg is deposited to the perfect state is about 60 days. It is but a short time after they reach the perfect state—a few days only—before they pair and the females deposit their eggs. The insects produced from these constitute the "fall" or "second brood," and pass through the same changes as those of the first brood. The perfect insects of this autumnal brood live through the winter.

The chinch-bug is one of the most formidable insect pests with which the farmers within the wheat-producing area of the United States have to contend. Mr. Walsh estimated the loss from the ravages of the chinch-bug in Illinois alone in 1850 at $4,000,000. Dr. Le Baron estimated the loss to the farmers of the North-west in 1871 at $30,000,000. A careful estimate by counties, from the most reliable data obtainable, showed the loss occasioned by this insect to the States of Missouri and Illinois in 1874 was not less than $50,000,000; and it is not probable that the loss to the nation in that year fell short of $100,000,000.

The discovery of the laws relating to the bearing of climatic conditions on the chinch-bug's development is of much practical value, for it enables the farmer to know beforehand most of the seasons when these insects will *not* appear in injurious numbers. Thus, if the year has been unusually wet and rather cool, the farmer knows that he need have no fear of them within two years, for in such a season they are reduced by the unfavorable conditions to a minimum; and two favorable years are necessary to develop them in excessive numbers. As a rule, with apparently few exceptions, the season following a "chinch-bug year" is moist and cool; hence one severe visitation is not likely to follow another within three years. The history of these visitations in the North-west, when compared with the meteorological record of that section, seems to indicate that they seldom appear in injurious numbers in more than two out of seven years, and but rarely more than once in seven years. That there are local visitations to some extent in intermediate seasons is true, but perhaps if the comparisons were limited to a given locality the same rule would hold good there. As the bugs from which the future generations are to be developed hibernate in the perfect state, hiding in the rubbish of the fields, it is evident that if they can be reached and destroyed in their winter retreats their development will be prevented; and since the females are much in excess of the males at this season, the laying of their spring crop of eggs will be largely prevented. If it is possible, therefore, to reach their winter retreats with fire, this will be the most effectual method of destroying them where irrigation is impracticable.

If the season has been dry, and an examination in the fall shows the chinches to be present in considerable numbers, although they have done no material injury, yet it is almost certain that if the next season is dry, unless killed by an unusual winter, the chinch-bugs may be expected in destructive numbers. It is true that they sometimes appear in great force when no complaint has been made the previous season. If the season is wet, examination is unnecessary, but if it is dry, search for them should be made by every farmer in the autumn before cold weather sets in, and in and around every field where found every hiding-place should be promptly subjected to a fiery ordeal. If it is found at the time wheat is harvested that the bugs have not taken their departure, this fact may be taken advantage of to destroy them. If the wheat is at once threshed and the straw scattered over the stubble and burned, it will destroy most of those that are there. This practice has been followed in some districts for a number of years by the German farmers, with good results. Irrigation is undoubtedly a most effective method of destroying these pests. It will be found most effectual in the spring after the eggs are deposited. Unfortunately, in the greater part of the region where this species proves most destructive the remedy is not applicable. Rolling the ground with a heavy roller after seeding is thought to be advantageous, for the mother-bug, having to work her way to the roots and underground stem in order to deposit her eggs, is less able to penetrate the hard and compact surface than loose soil.

We are decidedly of the opinion that the best method of contending with these pests, so far as corn and spring wheat are concerned (for winter wheat is seldom seriously injured by them), is to plant or sow such varieties as mature early. If the season has been dry, and examination in the autumn shows the bugs to be present, and the winter following is not of the character to destroy them, then the seeding and planting should be done as soon as possible in the spring, and oats should be relied upon for the fodder- or feed-crop instead of corn, since oats are less liable to injury than the latter.

The summer brood, when compelled to migrate in search of food, move chiefly on foot. Since they all go together or in bodies when the movement commences, and the movement is usually in the same direction, it is apparent that if an obstruction can be so placed as to retard their progress, this will mass them in a comparatively small space and render their destruction much

easier than when they are scattered through the fields. If the obstruction can be made to bar their progress effectually, they will be compelled to seek food elsewhere or perish. Farmers who are aware of this fact have had recourse to a number of expedients to save their crops. One of the devices employed is to set up boards edgewise around the field or along the side which the bugs are approaching, and to besmear the boards with tar or kerosene. A more common method is to plough a narrow strip around the field, keep it well pulverized by harrowing and rolling, and then plough one or two furrows in this dusty strip. This work should be done over again every day or two, care being taken to keep the strip as thoroughly pulverized as possible, for the bugs cannot travel well through the dust. As the insects attempt to crawl up the sides of the dusty furrows, the loose particles give way and they roll back to the bottom. If they accumulate in the furrows a log or stone must be drawn through them, so as to crush and destroy them. As it is always dry weather when they migrate, it is not difficult to keep the ploughed strip pulverized if the clods are well crushed at first. Ditching is sometimes resorted to. Care should be taken to have the side next the protected field perpendicular. (C. R.)

CHINCHILLA, a South American quadruped of the order *Rodentia*, family *Chinchillidæ*; the *C. lanigera* or *C. brevicaudata*. Animals of this family belong to the hystricine series of simple-toothed rodents; the rootless molar teeth are divided into transverse plates by the enamel folds; the incisiors are short; there is one premolar above and below; the clavicles are perfect. In the genus *Chinchilla* proper the fore feet are five-toed, though the thumb is very small; the hind feet have four toes; the tail is long and bushy; the ears are large and rounded; the length of *C. chinchilla* is nine or ten inches, the tail about half as long; the general appearance is squirrel-like. The beautifully soft and fleecy pelage, gray marked with darker, is a well-known article of commerce, formerly, however, in greater demand than it is at present. There are other chinchillas of a different genus, as Cuvier's (*Lagidium cuvieri*), of larger size, with longer ears and tail, and four-toed on both feet. All are alpine animals, inhabiting the Andes of Ecuador, Bolivia, Peru, and Chili, and noted for the activity they display in skipping among the rocks. They are shy, and chiefly nocturnal in their habits. A much modified member of the *Chinchillidæ* is the biscacha (*Lagostomus trichodactylus*) of the Pampas. (See BISCACHA.) (E. C.)

CHINOOKS, a family of American Indians which formerly occupied the valley of the Columbia River west of the Cascade range and south to Rogue River, between the Puget Sound Indians of the north and the California group of the south. These tribes are closely related in customs, though not in language. They were once a numerous and powerful people, but are now almost exterminated by war, disease, and the advance of the whites. Only a squalid and miserable remnant remains. They are of low stature, and seem to have very little endurance. The face seems more Mongolian in character than that of most other Indians. The peculiar custom of flattening the head, which gave the Western Indians the name of Flatheads, seems to have originated in this region, and the Chinooks were almost the only North American people who persistently practised it. The origin of this custom is unknown. The object is to produce a straight line from the point of the nose to the crown of the head, which is done by binding the infant immediately after birth on a piece of board, while another piece of wood, bark, or leather is placed on the forehead and tied to the plank with strings, which are tightened every day. It takes from three months to a year to produce the desired effect. Soft pads are placed between the skin and the wood, and little pain seems to be felt, the bones at that age readily yielding. There is no apparent injury to the brain or the health.

The salmon of the Columbia formed the chief food-supply of the Chinooks, being taken with the spear and the net. The weaving of baskets and matting formed their principal industry, while their boats, dug out of logs, were very light and shapely. The Chinooks were not a bloodthirsty people, and in their frequent quarrels little injury was done. They were more a commercial than a warlike race, and were very shrewd in their trade-dealings with other Indians. Slavery was practised, as in all the coast tribes, and marriage consisted in the taking as many wives as the husband could buy or support.

The languages of the Chinooks are complex and difficult, and a peculiar dialect has arisen for ease of intercommunication called the "Chinook Jargon." It seems to have originated among the tribes before the advent of the whites, but has been greatly modified and extended by European intercourse. Many French and English terms, in degraded forms, have been introduced by traders and trappers, the dialect serving as a medium of intercourse between the whites and the Indians. There have been published a vocabulary of their principal language and a *Dictionary of the Chinook Jargon*, both by George Gibbs (1863). The principal tribes or bands were the Watlala, Skilloot, Cathlamet, Wahkiahkum, Clatsop, Klackamas, Calapooya, Yamcally, and Killamook or Tillamook. Their various languages seem radically distinct from each other and from the other Indian tongues. Nearly all these Chinook languages are now extinct, being known only by published vocabularies.

CHIPMUNK, or GROUND SQUIRREL, a small North American quadruped of the genus *Tamias*, family *Sciuridæ*, order *Rodentia*. There are several species to which the name is applicable, that one to which it is usually given being *T. striatus* of the Eastern United States. *Tamias* stands on the dividing-line between the true arboreal squirrels (*Sciurinæ*) and the marmot squirrels (*Arctomyinæ*), rather inclining to the latter. Cheek-pouches are present; the tail is long, bushy, and distichous, though less developed than in *Sciurus*; the coloration is characteristic, all the species being striped on the back or sides, or both. The teeth vary from *pm.* $\frac{1-1}{1-1}$ to *pm.* $\frac{2-2}{1-1}$. In *T. striatus*, the representative species, there are five black stripes, the two lateral of which enclose a white one on each side; the general color is brown, reddening on the haunches; the length of head and body is five or six inches, the tail about two-thirds as much. *T. asiaticus* is a smaller species common to both hemispheres, more numerously streaked and otherwise different; in North America it runs into several varieties, one of which is *T. quadrivittatus*. The other species, larger and conspicuously different from the foregoing, are *T. lateralis* and *T. harrisi*, of Western and South-western North America; both are light-colored, with a whitish streak on the flanks, which in the first named is set between two black stripes, as is not the case with the other. The chipmunks are provident animals, laying up great stores of nuts and seeds in their retreats; they are generally observed

about fences and brush-heaps, among rocks or fallen trees, etc.; they are very active, and climb trees with almost the agility of true squirrels. (E. C.)

CHIPPEWA, a village in Welland county, province of Ontario, Canada, at the junction of the Chippewa and Niagara rivers, about two miles above the Falls. It contains manufactories of steam-engines and stoves. Population, 664.

In this vicinity a battle was fought July 5, 1814, between a British force under Gen. Riall and an American army under Gen. Jacob Brown. On the morning of July 3 the latter, with 3500 men, including two brigades of regulars, had crossed the Niagara above and surprised Fort Erie, which had a garrison of only 140 men. The next day Gen. Winfield Scott's brigade pushed on to Street's Creek, 16 miles farther. The British army was still north of the Chippewa, but both armies crossed the respective streams on the morning of the 5th, and a spirited action ensued, the result being that the British retreated across Chippewa River, burning the bridge behind them. The honor of the victory belonged to Gen. Winfield Scott, as it was won while Gen. Brown had gone back to hurry up additional troops. The actual forces engaged were, on the British side, 2100, and on the American 1900. The British loss was 503, of whom 135 were killed; the American, 335, of whom 68 were killed.

CHIPPEWA FALLS, the county-seat of Chippewa co., Wis., is on the Chippewa River, 12 miles N. E. of Eau Claire and 90 miles E. of St. Paul, on the Wisconsin and Minnesota Railroad and the Chippewa Falls and Northern Railroad. It has a court-house, jail, four hotels, two banks (one national), three weekly newspapers, five churches, and four schools. The Chippewa River and Duncan Creek here furnish abundant water-power, which is used in a saw-mill, two planing-mills, two sash-and-door factories, and a shingle-mill. The city is the centre of trade for an extensive lumber-region. It was incorporated in 1870, and is lighted with gas. Its property in 1881 was valued at $2,500.000; its public debt was $35,000, and its expenses were $15,000. Population, about 8520.

CHOATE, RUFUS (1799–1859), an American lawyer and statesman, was born Oct. 1, 1799, in that part of Ipswich, Mass., now called Essex. His father, David Choate, was a man of strong native sense and unswerving integrity, and his mother, Miriam Foster, was noted for a native dignity of bearing, quickness of perception, and ready wit. Their son, early noted for an insatiable thirst for knowledge and an extraordinary tenacity of memory, began the study of Latin at the age of ten, and after a term at the academy in Hampton, N. H., entered Dartmouth College in 1815. The four years which Choate spent at Dartmouth were critical in the history of the college, being memorable for the legal contest between the board of trustees and the State legislature. The year after his graduation he spent as tutor in the college, and in 1820 he entered the law-school at Cambridge, Mass. The next year (1821) he spent at Washington in the office of William Wirt, then Attorney-General of the United States, and finally he was admitted to the bar at Salem, Mass., in 1823. He opened an office at South Danvers (now Peabody), and here and in Salem he spent the early years of his professional life. He was early sent to the State legislature as a representative, and subsequently was a member of the senate, and in 1830 was chosen as a representative in Congress. In April, 1833, he was re-elected, but resigned his office at the close of the first session, having determined to remove his residence to Boston. In that city, the centre of the learning and refinement of New England, stimulated by the larger rivalries of its distinguished bar and by the opportunities of emolument and professional distinction, he devoted himself with immense diligence and earnestness to his chosen profession, nor was it long before he gained recognition as a thorough lawyer, and especially as one of the most ingenious, eloquent, and successful advocates.

In 1841, Daniel Webster having accepted the office of Secretary of State under Pres. Harrison, Mr. Choate was chosen to succeed him in the U. S. Senate. While in that body he spoke on most of the important questions—on the McLeod case, the Bank Bill, the confirmation of Mr. Everett as minister to England, the Bankrupt Law, on Mr. Clay's resolution for retrenchment and reform, the Naval Appropriation Bill, the tariff, the bill to provide further remedial justice in the courts of the United States, and more earnestly and eloquently still on the ratification of the Webster-Ashburton Treaty. In December, 1843, he delivered before the New England Society in New York an oration memorable for its eloquence and for the subsequent discussion on some of the principles of church government to which it led. In 1844, Mr. Choate made one of his most able and eloquent speeches in the Senate, against a resolution to give notice to the English Government of the termination of the joint occupancy of Oregon. In the political contest of the same year he earnestly supported the nominee of the Whig party, Henry Clay. On the ground both of unconstitutionality and inexpediency he opposed the admission of Texas.

At the close of the session in 1845 he left the Senate and returned to his profession. Thenceforward, until his death in 1859, there was hardly a case of peculiar difficulty or perplexity before the courts of Massachusetts in which he was not, if possible, retained. He was many times called to other States and to Washington in cases involving legal difficulties or great pecuniary responsibility. During these years, crowded with professional work, he never failed in his love of letters but by resolute determination secured some small portion at least of every day for pursuits which were most congenial to his tastes—for the study of the ancient classics, of history, and of philosophy. A brief tour in Europe in 1850 afforded him a needed vacation and enabled him also to compare more intelligently the characteristics of the older and the newer civilizations. The clear result was to strengthen his patriotism, while it made him, if possible, the more sensible of the perils which history taught would be likely to follow the disruption of the Union. During this era the anti-slavery agitation had received a fresh impulse from the acquisition of new territory from Mexico. Mr. Webster made his memorable speech on the Constitution and the Union. The strain upon our institutions was so great that the danger of a rupture was imminent. Union meetings (so called) were held in many States. At the meeting in Boston, in Faneuil Hall, Mr. Choate, in a speech profoundly earnest and solemn, pointed out the dangers which threatened the republic. The key to his later life will be found in his dread of disruption and civil war, which he thought he foresaw, and in the duty, as he conceived it, which the times imposed. He enforced this duty in his address on Washington, delivered in February, 1851, and especially in an address before the Story Association in

Cambridge a few months later. In 1853 he was a member of the Massachusetts convention for revising the constitution of the State. In July of the same year he gave at Dartmouth College his memorable eulogy on Daniel Webster, a production which is unsurpassed in that species of eloquence.

During the next few years Mr. Choate's health began to show signs of failure. His professional business was great and exacting, but, yielding to solicitations from one and another, he found time to prepare a charming lecture on "Sir Walter Scott and the Early British Poets of this Century," and another on the "Eloquence of Revolutionary Periods," and still another on "Jefferson, Hamilton, and Burr." His last public effort was an oration on the 4th of July, 1858, on "American Nationality: its Nature, some of its Conditions, and some of its Ethics." He was so weak that he could hardly deliver what he had to say, and his voice was too feeble to fill the hall, but his last public words were, as he wished them to be, in behalf of the one undivided nation which he so warmly loved. During the succeeding autumn and winter his health became more precarious, though he generally went to his office and did not entirely forsake the courts. In the spring of 1859 he determined to try the effect of a voyage to Europe. It was thought that this might relieve his complaints, if it did not lead to a cure. Accordingly, after several disappointments, he sailed for England June 29, but before the ship reached Halifax it became evident that he was not able to continue the voyage. Yielding, therefore, to the advice of friends, he was taken ashore at Halifax, N. S., and there July 13, 1859. His remains were subsequently taken to Boston and buried in Mount Auburn Cemetery.

Mr. Choate's eloquence was unique, brilliant, fascinating, indescribable. To every subject and every effort he brought his full power of thought and feeling, of imagination and wit. The dullest and driest theme he touched with interest and illuminated by the lights which he flashed upon it from all sources. His logic was concealed by the profusion of graceful imagery, but whoever attempted to break the chain was sure to find links of steel beneath the garland of flowers. His mind was deeply reverential towards God, and the great problems of our nature and destiny were always present to him, modifying his thinking and his life. He died in the full strength of his powers, untouched by age, in the fulness of his fame and in the midst of universal love and respect.

CHOCTAW INDIANS, a North American tribe, of the stock known as Appalachian, or Chahta-Muskoki, its two principal branches being the Muscogees (Muskoki), or Creeks, and the Choctaws (Chahta). The last named are closely akin to the Chickasaws, the difference in their languages being merely one of dialect. Their country in colonial times lay south-east of that of the Chickasaws and west of that of the Creeks; it is now mainly divided between the States of Alabama and Mississippi. They lived chiefly by agriculture, and formerly had the practice of flattening the heads of their children by pressure. In 1540 they fought a terrible battle with De Soto at their capital, called Mauvilla (whence Mobile was named); afterward they were allied with the French, and later with the English. In the war of 1812–15 they fought for the United States against the Creeks and the English. Georgia offered them full citizenship (but even before 1800 some of the people had begun to cross the Mississippi), and by the treaties of 1820 and 1830 all their original country was ceded to the whites in exchange for lands in the Indian Territory, and for a large gift of goods and money. From 1837 to 1855 the Chickasaws were joined with them in a tribal union, and up to this day their lands are somewhat blended and a slight bond of alliance still subsists. The two tribes have now separate and regular governments. The country is divided into counties. The present Choctaw country lies south of that of the Cherokees and Creeks, east of the Chickasaw lands, and is bounded east by the State of Arkansas and south by Texas. Pine timber and coal are abundant, and silver-bearing lead-ores are reported. The people are making commendable progress. The area of their land is 10,450 square miles. The tribe numbers (1890), 9996 persons. There are 59 common schools, besides male and female academies and private schools. Promising youths are in many cases sent to college at the public expense. The Choctaws are very generally Christians. They are less progressive in some respects than their neighbors the Chickasaws. Being slaveholders, they were drawn into alliance with the Southern Confederacy in the war of 1861–65, and consequently suffered much. Pressure has been brought upon them to adopt their freedmen as members of the tribe, but this they have thus far refused to do; but in other respects the freedmen are treated with kindness. There are on the reservation 14,397 whites.

See Vol. V. p. 591 Am. ed. (p. 680 Edin. ed.).

CHOLERA, in North America. The first introduction of epidemic cholera in North America took place in the spring of 1832, in connection with the arrival of large numbers of emigrants in Canada. At that time there appears to have been no proper system of quarantine on the St. Lawrence. No isolation of persons from ships infected with cholera was attempted, and those who were apparently well were allowed to proceed at once on their journey. Cholera appeared at Quebec, Montreal, and other points in the early part of June, and from these places spread rapidly, following the lines of travel pursued by emigrants. From the St. Lawrence the disease entered the United States by the way of New York, in which State some twenty cases occurred between June 13 and the end of the month. It is asserted that cholera arrived at the port of New York in infected ships prior to its outbreak on the St. Lawrence, but that for prudential motives the facts were suppressed by the board of health. The disease rapidly spread from New York into adjoining towns and cities. In the following year (1833) the cholera first appeared in the United States in New Orleans, in which city it was epidemic in May. Previous to this time it had become epidemic in Cuba. From New Orleans the disease was carried northward, affecting almost all the large cities in the Mississippi Valley. In 1834 the cholera was again introduced into North America by the way of the St. Lawrence quarantine station, first appearing early in July, from which time it rapidly spread, advancing along the line of the St. Lawrence and from thence into Upper Canada and the United States. In 1835 cholera appears to have been introduced again into the United States from Cuba, and after this year there was an immunity from this disease until 1848.

See Vol. V. p. 592 Am. ed. (p. 682 Edin. ed.).

The following account of its introduction in that year is given by Prof. Alonzo Clark: "Two ships left Havre, one on the 31st of October, the other on the 9th of November, 1848. The latter ship, the New

York, was bound for the city of New York; the former, the Swanton, was bound for New Orleans. The passengers of these two ships were of the same character, mostly German emigrants; they had been taken up in both instances at Havre, which port was at that time said to be free from cholera. They had come to Havre for the purpose of finding a ship for this country. One report states that a portion of them had left infected places in Germany. The ships came out with a clean bill of health. The New York had been at sea sixteen days when cholera appeared—that is, on the 25th of November; the Swanton had been at sea twenty-seven days when the first case occurred, it being on the 26th of November. They were 1000 miles apart. They were both off the coast of the United States, one in latitude 25° 47′, and the other in the parallel of 42°. The outbreak on the New York is by the captain of the vessel ascribed to the following fact: A very cold, chilly wind came up on the 24th, and the passengers found themselves in want of warm garments; in his own phrase, 'there was a general overhauling of baggage for warm clothing.' Then the next day became exceedingly hot, and on that day the first case of cholera occurred. It has been found that on board the ship New York there was an emigrant who had clothing that belonged to an individual who had died in Germany of cholera. During the day of intense cold some articles of this clothing were taken from the chests and were worn by several of the passengers, and these passengers were the first taken on the ship. The two ships go on their voyage. One arrives in the Harbor of New York on the 1st of December, six days after the outbreak, having lost seven of her passengers; the other goes into the Mississippi River and up to New Orleans, having lost several passengers, reaching the city December 11."

On the arrival of the vessel at New York, on the 2d of December, eleven cholera patients were sent to the quarantine hospital. The Swanton reached the city of New Orleans on the 11th day of December, and the day of her arrival one cholera case was sent to the hospital. Two days after her arrival the first case in the city was announced; this was also an emigrant from the Swanton. This was followed by a rapid increase of the disease until the following June, in which month it culminated in more than 2500 deaths. It is however, possible that cholera may have been introduced into New Orleans by emigrant ships several days before the arrival of the Swanton. The disease gradually spread throughout the country during the year 1849, reaching San Francisco in October. From New Orleans it also spread to Cuba and to the Isthmus of Panama. It is very doubtful whether North America was free from epidemic cholera from this time until about the end of 1854. It existed in Cuba in 1851, in 1852, and in the middle of 1852 it appeared in the Mississippi Valley, notably in Chicago and St. Louis.

According to Dr. Alonzo Clark, ships from infected ports, bringing emigrants suffering from the disease, arrived in large numbers in the Harbor of New York in the autumn of 1853. The first appearance of cholera following this, however, was not in New York, but in Chicago in the latter part of April, 1854, where it occurred among recently arrived emigrants, gradually increasing until it was declared epidemic in June. The infected ship Glenmanna, on which forty-five passengers had died of Asiatic cholera during the voyage, arrived at the quarantine station below Quebec on the 15th of June, and this was soon followed by the spread of the disease in Canada.

The next outbreak of cholera in the United States occurred in the city of New York in May, 1866. Prior to this date a number of vessels arrived at New York from European ports at or adjacent to which cholera was known or reported to prevail, and had been detained for observation and fumigation. Thirty such vessels arrived during the latter part of 1865, and upon some of these deaths from cholera had occurred during the voyage. The disease, however, did not spread beyond the emigrants' hospital on Ward's Island. It is usually considered that the cholera epidemic of 1866 in North America was due to the steamship England, which left Liverpool for New York on the 28th of March, having 1185 German and Irish emigrant passengers. One hundred and sixty cholera cases, with forty-six deaths, occurred on this ship prior to the 9th of April, at which date she put into Halifax. The pilot who spoke her on her arrival, but would not board on account of the cholera, but was towed after her, died on the 11th of March at his home, near Halifax. His five children all had the disease, and two of them died. The health officer who boarded the ship died of cholera on the 17th. On the 18th of April, 1866, the first vessel having cholera on board arrived at the New York quarantine—viz. the steamship Virginia. From this point the disease gradually spread, being carried in part on the lines of emigration and in part by recruits sent out from Fort Columbus, Governor's Island, New York Harbor, in the garrison of which the disease appeared about the 1st of July.

The next outbreak of cholera in the United States began in New Orleans in February, 1873, but there is no satisfactory evidence as to the mode of its commencement or the manner of its introduction. From New Orleans the disease spread to the Mississippi Valley, appearing in Mississippi, Arkansas, and Tennessee in April; in Illinois, Kentucky, Ohio, and Indiana, in May; in Alabama and West Virginia, in June; Georgia and Minnesota, in July; Pennsylvania, Texas, Utah, Dakota, in August; and in New York, in September. An elaborate account of this outbreak was published by Congress under the title *The Cholera Epidemic of 1873 in the United States.*

The precise origin of the first cases of epidemic cholera in each of the outbreaks which have occurred in this country is difficult or impossible to trace, but in every instance these outbreaks have been preceded by the appearance of the disease in Europe or the West Indies, and by the arrival of ships either known or fairly presumable to have been infected. The course of the disease has followed the main lines of transportation, especially those used by emigrants; and in the epidemics of 1866 and 1867 the evidence of its transmission by parties of recruits and soldiers going from infected parts to the West and South is beyond question. In some cases it seems very probable, though not actually proved, that the cause of the disease has been carried far into the interior in the baggage of emigrants, which baggage had not been opened since it was packed in infected localities in Europe, and the carriers of which showed no signs of the disease until they arrived at their inland destination and opened their boxes and bundles. This probability is sufficiently great to warrant the giving of special attention to the opening and thorough aëration and purification in our quarantine stations of all luggage brought in by emi-

grants when cholera exists in the vicinity from which they have come. (J. S. B.)

CHOPIN, FRANÇOIS FREDERIC (1809–1849), was born March 1, 1809, at Zela Zowa Wola, near Warsaw, Poland. His father was a private tutor from Paris, who educated the sons of gentlemen, and among these Frederic found suitable companions in his boyhood and became imbued with the national spirit, although from his mother (who was of pure Polish blood) he received the characteristics so markedly Sclavonic. At nine years of age Chopin appeared in public as a pianist, playing a concerto and making improvisations, and at nineteen was not only one of the very greatest pianists of the time, but one who had a marked individuality as regards execution, form of the passages executed, and who introduced compositions so original as to reveal a new world of beauty to musicians and art-lovers. Before he was twenty years of age he had given concerts in Vienna, Dantzic, Berlin, Leipsic, Dresden, and elsewhere. In 1836, while in Paris, he first met Georges Sand, to whom he was ever grateful for her kindness in nursing him through the winter of 1838–39, when he suffered from bronchitis. They had retired to Majorca in the autumn, that Chopin might leave the gay and busy life of Paris, which had increased his tendency to consumption. He died at Paris, Oct. 17, 1849. His obsequies were celebrated with great pomp at the Madeleine (Mozart's *Requiem* forming part of the service, in accordance with his wishes), and he was buried at Père la Chaise, between the graves of Bellini and Cherubini.

See Vol. V. p. 595 Am. ed. (p. 685 Edin. ed.).

Chopin has been greatly misrepresented. He has been caricatured in *Lucrezia Floriani*, and biographers have exalted the poetic side of his nature and artistic powers, as though his music of itself were not worthy so great attention. He was the constant associate and friend of Meyerbeer, Bellini, Berlioz, Balzac, Heine, and Liszt; it is made to appear that he was merely admitted to their charmed circle—in it, but not of it—although he was most truly one of its most illustrious members. Nor has any composer suffered so much as Chopin from becoming popular. When his music attracted amateurs it was played with such exaggerated expression, forced emphasis, variations of speed, *tempo rubato*, etc., and ridiculous affectations, that it appeared to ordinary listeners as almost grotesque.

He wrote seventy-four numbered works and seven unnumbered ones, all of which consist mostly of pianoforte concertos, sonatas, études, mazurkas, polonaises, rondos, scherzos, ballades, etc. Chopin so idealized the melodies of his country that they found an echo in many hearts in Europe and America. They remind us of the ingrained sorrows of the Polish people, whose lands were overrun with Mongol Tartars and other peoples, whether these were going east or west in their migrations. He is therefore the representative musician of his country. Although his music is rarely sublime, heroic, profound, or mighty, yet it is never trivial or commonplace, and is as far as conceivable removed from the slightest suspicion of vulgarity.

His shortest nocturnes are extremely delicate and tender. The melodies are embellished with grace-notes that are original, beautiful, and make the sorrow expressed by the music seem more hopeful. The treatment of the harmonies, the rhythms, the forms, and intertwined melodies proves the hand of a most highly trained, and legitimately-trained, musician. Yet notwithstanding this, his writings are spoken of as amateurish, though clever. Chopin, from excess of modesty, dreaded concert appearances, and hence his detractors took advantage of his retiring nature. His compositions seem more like confessions of a private personal character suited for the hearing of a few kindred spirits, rather than adapted for large concert-halls, the display of great executive power, and to entertain a large assembly. The music of Chopin may therefore be regarded as subjective, and, not moving in the extended psychologic range of a Bach or Beethoven, may appear as comparatively narrow; yet it finds a place in the human heart that other composers have not sounded or discovered; causes sympathetic vibrations to respond to its strains that have not been called forth before; occupies a position in the art of the nineteenth century that cannot otherwise be filled; and enriches music by exhibiting a new and fascinating phase of it, which causes the composer and his country's sorrows to be remembered well. When the Russian soldiery found in the second story of his homestead (in the room which Chopin's sister occupied) his piano and mementoes that had been preserved so religiously by the family, and dragged them out into the courtyard to be burned, the whole civilized world blushed at the vandalism.

(S. A. P.)

CHOSE IN ACTION, in law, a right to recover a debt or money or damages for breach of contract, or for a tort connected with contract, which cannot be enforced without action.

It was a favorite doctrine of the ancient common law that choses in action were not assignable. No person, it was held, could transfer what he had not actually reduced to possession. Hence the owner of a right of action could sue in his own proper person only, and could confer no such right upon a third party. Courts of equity have, however, constantly recognized the validity of such assignments, and have extended their aid to assist the assignee in enforcing his rights wherever it was necessary to do so. Common-law courts have now, however, adopted equitable principles with regard to the assignment of choses in action in many cases, and the intervention of chancery is therefore seldom needed. The assignment of a mere litigious right will not be recognized either at law or equity. Hence the right of action for a mere personal tort or a bare right to file a bill in equity on the ground of fraud cannot be transferred. It seems, however, that a right to recover damages for an injury to property may be transferred.

No particular form is necessary to effect the assignment of a chose in action. It may be either in writing or by parol. The assignee must, however, in order to protect his rights as against subsequent innocent transferees of the assignor, take such steps as the peculiar circumstances of the case will admit to indicate that title has vested in him. In order to protect himself against any subsequent payment of the debt or claim by the debtor to the assignor, the assignee must at the time of the assignment notify the debtor thereof.

As a rule, the assignee of a chose in action takes it subject to all existing equities between the assignor and the debtor, but free of those outstanding equities in third parties of which he has no notice. (L. L., JR.)

CHOUTEAU, AUGUSTE (1739–1829) and PIERRE (1749–1849), the founders of the city of St. Louis, were born in New Orleans. They joined the expedition of Laclède in Aug., 1753, to establish the fur-trade in the region watered by the Missouri and its tributaries, and Auguste was placed in command of a boat. In the following winter they selected a point 61 miles above St. Genevieve as their principal post, and named it St.

Louis. Auguste commanded the party that commenced operations here Feb. 15, 1764. In course of time both brothers became heads of highly respectable families, and their name long commanded safety and hospitality among the Indians of the North-west. Auguste died Feb. 24, 1829. and Pierre July 9, 1849.

CHRISTADELPHIANS, a small sect of American origin, with congregations in the United States, England, and New Zealand. The Christadelphians, or Brothers of Christ, hold that all other churches are in apostasy, and for the sake of distinction they call their churches *ecclesias*. They regard John Thomas, M. D., an Englishman, as their founder. Mr. Thomas, according to his own account of the rise of the Christadelphians, joined many years ago "the most apostolic and scripturally-enlightened religious organization in America," the Disciples of Christ. Study of the Scriptures, however, convinced him that the "religious teaching of the day" was essentially opposed to the Bible. Therefore, having found the truth for himself, he began to teach it by "platform and press in America and England." He did not claim to found a new sect, but only to revive the Church of Christ and his apostles. Within a generation churches of this faith have existed in Jersey City, Philadelphia, Washington, and other cities; books and tracts are published in Jersey City and Birmingham, England. The Christadelphians assert that all the Christian churches are in apostasy, and that there is no salvation within the pale of any of them. There is salvation only for those in the Christadelphian Ecclesia. Their doctrinal belief is set forth in thirty-seven propositions, of which seventeen relate to the kingdom of God and twenty to the Lord Jesus Christ. They believe that there is "one God, out of whom all things (even the Son and the Spirit) have been creatively elaborated;" that the Spirit is not personally distinct from the Father, the difference being that the Father "is Spirit in focus so intense as to be substance and light inconceivable," while the Spirit is continually outflowing from the divine centre; that Christ is the manifestation of the one eternal Creator, and was called Son because of his manhood (when he was in the flesh his nature was purely human), the Deity dwelling in him being the Father; that Christ was of human nature raised up as a second Adam "to remove by obedience, death, and resurrection the evil consequences resulting from the disobedience of the first Adam;" that by a "full discharge of its claims in a temporary surrender to its power" he abrogated the law of sin and death and developed immortality by resurrection; that the devil does not exist personally, but is only a scriptural personification of sin; that man consists only of body and life, and that immortality can be attained only by acceptance of the gospel; that the wicked will be annihilated; that those who have never heard of the gospel "will pass away in death as though they had never existed;" that Christ will return from heaven to set up his kingdom in the earth, when he will judge the living and the resurrected dead, and reconsign the wicked "to corruption after punishment" and invest the saints with immortality; that baptism, which is necessary to salvation, is a bodily immersion, "only enjoined on those who have intelligence enough to believe" the gospel, and therefore "unauthorized and useless" in the case of infants; that few (only the Christadelphians and those who believe and obey as they do) will be saved; that the "truth of apostolic prophecy requires the world at the present time to be in a state of complete and universal apostasy;" that there is no deliverance from this state by the preaching of the gospel, but only by divine interference; that the kingdom of God preached by Christ and his apostles is a "divine political dominion to be established on earth with the object of upsetting and superseding all existing governments" and restoring the ancient kingdom of Israel; that the city of Jerusalem will become the queen city, the residence of Christ and the headquarters and metropolis of the kingdom of God; that Christ will rule, and his saints with him, and that he will return from heaven for this purpose and visibly appear; that his reign will be for a thousand years over mortal nations, sin and death continuing in the world in a milder degree; that at the close of this millennium Christ will surrender his supremacy and become subject to Deity, who will proceed to judgment, after which only redeemed immortal persons will remain. In support of all these propositions copious quotations from the Bible are given. Thomas, who has been dead some years, declared in his *Revealed Mystery* that Romanism and Protestantism are the "mothers of harlots and abominations of the earth." In regard to the second advent of Christ, Thomas held in his *Book Unsealed*, prepared in 1869, that the world was now in the period of the sixth vial, during the pouring out of which Christ would come. His advent must be quite near.

The Christadelphians meet every Sunday "to eat bread and drink wine in remembrance" of Christ, to sing the "songs of Zion" "concerning the Christ as found in David," to offer prayers, and to read the Scriptures and hear lectures. A monthly periodical called *The Christadelphian* is published in Birmingham and Jersey City.

CHRISTIAN COMMISSION, THE UNITED STATES. This was an organization formed during the Civil War to supply the religious and moral, and to some extent the physical, needs of the soldiers of the Union army. During the first enthusiasm of volunteering, in 1861, many individual Christians, and especially the Young Men's Christian Associations which within the previous five years had been formed in most of the larger towns and cities, engaged actively in ministering to the wants of those who had enlisted from their sections of the country. But the experience of a single campaign proved the necessity of co-operation to make their assistance effective, and of a well-regulated system to conduct a work whose magnitude was constantly increasing, as well as to overcome the unavoidable friction with military discipline. At the suggestion of Mr. Vincent Collyer, a convention was called by the national committee of the Young Men's Christian Association for this purpose. It met in New York, Nov. 14, 1861, and organized the Commission. Mr. George H. Stuart of Philadelphia was chosen president, and retained that office throughout its existence, discharging its onerous duties with marked ability, zeal, and success. The movement was at once approved by President Lincoln and the other authorities at Washington, yet for some time it received little encouragement from the people, and was thus hindered in carrying out its intentions. This was perhaps chiefly owing to the previous establishment of the UNITED STATES SANITARY COMMISSION (*q. v.*), which had grown out of the Women's Central Association for Relief, organized in New York in June, 1861. As the object of the latter was simply to supply the deficiencies in the provision hastily made by the government for the health and comfort of the soldiers.

the originators of the Christian Commission felt that there was abundant room for ministering to the higher wants of the soldiers. Both societies sprang from the philanthropic Christian sentiment of the people of the North. The earlier organization obtained widest favor, but as the work progressed the members of the evangelical churches were more disposed to contribute through the agency of the distinctively religious society. In the accomplishment of their self-imposed mission both societies had the same experience. The army-officers at first regarded with disfavor and jealousy the attempts of either to benefit the men, yet gradually these volunteer helpers, by patient continuance in well-doing and cheerful submission to the restrictions of army life, won their way to cordial appreciation by all. The plan adopted by the Christian Commission after some trials was to have for each army a general field-agent, with one or more assistants. This agent established stations wherever needed, and assigned the delegates to their work, while he was responsible on the one hand to the military authorities, and on the other to the central executive committee of the Commission. A large force of volunteer delegates, both ministers and laymen, who were enlisted and were required to enter the service for at least six weeks, were subject to the direction of the field-agents. They assisted the chaplains of the regiments and did such other work as the necessities of the case required. Especially after each great battle was there abundant need for the services of all the helpers that could be found. These delegates served usually without compensation, only their necessary expenses being provided for. Transportation was generally allowed by the army officers. An auxiliary commission in New York had charge of the work in the navy, sending out delegates for not less than six months, and generally paying them small salaries. The entire work was in effective operation by the end of 1862 wherever the Union forces were employed. A full system of reports from the delegates and agents enabled the Commission to keep the Christian people of the North fully informed of its extent and results. In 1863, in addition to a vigorous prosecution of the work as previously carried on, chapels were erected and chapel-tents provided for religious services, correspondence between soldiers and their families promoted, and much was done to alleviate sufferings in emergencies. An important part of the work was the formation of regimental libraries for the soldiers, especially during the winter cessation of military operations. At the close of the war these libraries were transferred to the posts of the United States army. In the latter part of the war, when the Confederate prisoners were retained in the North, the Commission extended its benevolent operations to them. Efforts were also made to reach the Union soldiers in Southern prisons, but these were frustrated by the Confederate authorities. When the war closed, in 1865, and the armies were disbanded, the Commission endeavored to extend its protecting care to the men until they were restored to their homes. Its work was continued also among the detachments of troops which were sent to the Southwest; so that its last field-station, at Fort Leavenworth, Kansas, was not closed till June, 1866. The last anniversary of the Commission had been held in the hall of the House of Representatives, Washington, Feb. 11, 1866. At this meeting testimonials of the value and efficiency of the work of the Commission were given by the Union and by prominent representatives of all branches of the government. During the four years of its existence the Commission employed 4859 delegates, distributed 1,466,748 Bibles and Testaments, besides ten millions of other books and nearly twenty millions of religious papers. Its total cash receipts had been $2,524,512, and other donations exceeded $3,000,000 in value. For details of its history see *Annals of the United States Christian Commission*, by Rev. Lemuel Moss (Phila., 1868). (J. R. L.)

CHRISTIAN CONNECTION, a denomination of American origin, usually classed with the Baptists, and often confounded with the larger and similar body known as the "Christians," or, more definitely, the DISCIPLES OF CHRIST (*q. v.*). Its members are sometimes called Christ-yans, by way of distinction, but they do not thus pronounce the name themselves. It grew out of the union, early in the present century, of parties of believers who had come out of the Methodist, Baptist, and Presbyterian churches for doctrinal reasons and to avoid human creeds and sectarianism. The first of these parties rose in Virginia and North Carolina under the leadership of the Rev. James O'Kelly, who withdrew from the Methodist Episcopal Church, chiefly on account of opposition to the adoption of the episcopal feature. He denied the doctrine of the Trinity as commonly held, and contended that the Bible was the only necessary standard of faith. With about a thousand followers he left the Church in 1792, and organized soon after the Republican Methodist Church. In 1794, at a conference held in Surrey co., Va., this designation was dropped and the name "Christian" assumed. The principles on which the new organization was formed were—(1) Christ the only Head of the Church; (2) no sectarian name; (3) the Bible a sufficient rule of faith and practice; (4) Christian character or vital piety the only test of membership; (5) the right of private judgment and liberty of conscience. It is stated that the Republican Methodists of North Carolina took similar action in 1793.

The second of the three movements from which the denomination sprang began in New England with the preaching of Abner Jones, a physician, in Lyndon, Vt. He was a Baptist, but was led to reject not only the name of the denomination, but its method of organization. He believed that articles of faith, church covenants, and councils were anti-Christian. He also denied the Calvinistic doctrines of predestination, reprobation, etc. He began to proclaim his views and organized a church in Lyndon in 1801, which was called simply "Christian." This was the first church of the connection in New England. The second church was founded in Hanover, N. H., in 1802. The next year Elder Elias Smith withdrew from the Baptist denomination, and soon a number of churches of the new faith were organized in different parts of New England by Elders Jones, Smith, and others.

The leaders of the third party of "Christians" were Barton W. Stone and David Purviance, and the scene of their labors was in the West. At the beginning of the present century there was a general revival in Kentucky, Tennessee, and other States known as the "Great Revival." Some of the Presbyterian ministers, it is claimed, preached doctrines which were not in harmony with the Calvinistic system, and the result was the trial and expulsion of several of them, including B. W. Stone, all in the bounds of the synod of Kentucky. Those who were expelled, including David Purviance, a licentiate, formed the Springfield presbytery, and most of their churches followed them into the

new organization. Three of the ministers were in Ohio and three in Kentucky. In a short time, however, the Springfield presbytery was dissolved (June, 1804), the reason stated being that, seeing the many divisions existing among professing Christians, and that they were simply establishing another party, and finding that the Bible gave neither "precept nor example" for sessions, presbyteries, synods, and the like, they chose to be simply Christians, putting away sectarian names and titles and organizations and human creeds and delegated ecclesiastical authority. Of the six ministers who constituted the presbytery, two became Shakers and two returned to the Presbyterian Church. Elders Stone and Purviance (they objected to the title *Reverend*) continued to preach in accordance with the principles declared in the act dissolving the presbytery. They travelled widely, holding meetings, organizing churches, and ordaining ministers, and the movement thus begun soon spread through Kentucky, Tennessee, Ohio, and other States.

For some years the New England party had no knowledge of the existence of the other parties. Perhaps the discovery was not made until 1808, when the Christians of the East began the publication of a religious newspaper, *The Herald of Gospel Liberty*, the first, it is claimed, in this country. The editor, Elder Elias Smith, says in his autobiography that he first heard in that year of Christians in Pennsylvania, Virginia, and Kentucky. A letter from a Christian pastor in Philadelphia, dated Oct. 24, 1808, written to the editor, stated that the movement had spread through Virginia, North Carolina, South Carolina, Georgia, Tennessee, Kentucky, Ohio, and the western part of Pennsylvania, and "thousands" were united in it. The Pennsylvania brethren, he said, had never heard of the churches in the other States, "being chiefly locked up in the German language." William Guiry, a prominent Christian minister in Virginia, said in 1809 that there were Christians in every State south of the Potomac, and that they probably numbered about 10,000. The first six volumes of the *Herald* contain frequent notices of ordinations; and a list of ministers in New England, printed in 1814, embraces forty-nine names, including those of six unordained ministers.

As the movement in New England had come out of the Baptist denomination, immersion was, as a matter of course, regarded as the proper mode of baptism, and infants were not recognized as proper subjects for the sacrament. In the West, however, the practice of sprinkling was continued till 1807, according to the custom of the Presbyterian Church, from which the leaders had come; but on a re-examination of the Scriptures some of them became convinced that infant baptism was not taught in them; and when, in 1807, a young woman applied for baptism by immersion, Elder David Purviance requested Elder B. W. Stone to immerse him, and he in turn immersed Elder Reuben Dooley and several others. Elder Stone was subsequently immersed himself, and immersion has been the prevailing rule since, although it was resisted by some at first. In Virginia, James O'Kelly and his colaborers practised sprinkling only for some years, but gradually a sentiment favorable to immersion grew up. O'Kelly opposed it, refused to immerse himself, and desired his brethren to observe the same rule. The question came to an issue in 1809, and a division occurred which continued several years. The liberty of choice of method of baptism, which Mr. O'Kelly opposed, was established through this division.

It has already been stated that the New England and Kentucky movements were partly the result of the denial of the Calvinistic doctrines of a limited atonement, election, and reprobation. The leaders of each appear also to have arrived at similar conclusions respecting the Trinity, on which, as has already been seen, Elder O'Kelly of Virginia held views deemed unsound. Elder David Purviance of Kentucky rejected the orthodox doctrine of the Trinity. He held that Christ was divine, but inferior to the Father; that, though he "now administers the kingdom," his kingdom will end; and that he is not coeval with the Father. Purviance and Stone also denied that the sufferings of Christ were vicarious; they taught that the object of the atonement was the reconciliation of man to God. Dr. Abner Jones of New England also held the Arian view of Christ, and denied that the atonement was expiatory. The Christians both East and West were generally regarded as Unitarian.

Among those who, with Elders Jones and Smith, labored to extend the movement in the East were Elder Daniel Hix (d. 1838), a Baptist of Massachusetts, who brought his church into the Christian Connection; Mark Fernald (d. 1851), who travelled almost constantly for many years through New England and made many converts; Joseph Badger (d. 1852), who labored successfully in New York, especially with his pen; Mrs. Nancy G. Cram (d. 1816) and Mrs. Abigail Roberts (d. 1841), who in preaching-tours in New York secured hundreds of converts; Simon Clough (d. 1844), who organized the first Christian church in New York City, and was considered the best educated minister in the Connection; and Frederick Plummer (d. 1854), who organized many churches in Pennsylvania. In the South, besides James O'Kelly, there were William Guiry, formerly a Methodist and author of a history of episcopacy and other works; Rice Haggard of Norfolk, Va., who wrote much for the new movement; Joseph Thomas (called the "White Pilgrim," because he dressed in white), who travelled almost constantly in Virginia and the Carolinas; and Mills Barrett, a successful evangelist. In the West, in addition to Stone and Purviance and Dooley, the names of Matthew Gardner, who helped organize the Ohio conference in 1820, and was a leading debater; Nathan Worley of the Miami Valley; William Kinkade, the author of *Bible Doctrine*, a theological work highly esteemed in the Connection; and John McCreary, a pioneer in Indiana,—deserve to be mentioned. As women were among the pioneer preachers, so they have continued to occupy the pulpits of the denomination and to labor acceptably as evangelists. The first ordination of a woman is stated, however, to have occurred as late as 1866. In the list of ministers for 1882 the names of women are quite frequent, both among the ordained and the unordained.

In the first years of the denomination ordinations were conducted by two or more elders, and there were general meetings which partook of a revival character. In the course of some years these general meetings developed into organized conferences, which ordained elders and cared for the general interest of the churches connected with it. It is stated in the life of Elder Joseph Badger that the first regularly organized conference in this country was formed at Hartwick, N. Y., in 1818. Yet there are notices of conferences in the South almost a quarter of a century before this date, though they were not held regularly, and a general conference or convention had met in Windham, Conn., in 1816, and adopted a declaration to the effect that the [illegible] of fellowship should be the "New Birth," and

ing but sin and denial of the Father and Son should destroy this fellowship. Another general convention, spoken of in Summerbell's *History of the Christians* as the first, was held in 1819, and thereafter such meetings were held annually until 1831, when the convention became triennial, changing to quadrennial in 1834. This was the origin of the American Christian Convention, the last session (quadrennial) of which was held in the fall of 1882 in Albany, N. Y. In the convention of 1842 eleven conferences were represented. The denomination had spread over the larger part of the settled territory of the United States, and had been represented by churches in Canada many years. According to the imperfect statistics given in 1844, there were no less than 1500 ministers and 500 licentiates, 1500 churches, and 325,000 communicants. The kindred body, the Disciples of Christ, also called "Christians," and often confused with the Christian Connection, was reported to have at this time about 200,000 communicants. It had risen many years after the Christian Connection was organized, and for a similar purpose—the rejection of creeds, the acceptance of the Bible as the rule of faith and practice, and the union of Christians. It was at first a movement within the Baptist denomination, but ultimately its leaders and followers were excommunicated, and were thus led to form a new denomination, which was intended to be unsectarian. Alexander Campbell, the founder, appealed strongly to the Christian churches in the West to unite with his followers. B. W. Stone, acknowledged to be the leader of the Christian Connection in the West and South-west, accepted Mr. Campbell's proposal on condition that the sectarian name "Disciples of Christ" be dropped for the simple title "Christians." A majority of the churches and ministers in Kentucky, Tennessee, Indiana, Ohio, and Illinois followed Mr. Stone. This withdrawal had of course a very marked effect on the statistics of both bodies.

The Christian Connection apparently has declined considerably in numbers since 1840. Ten or fifteen years after the division in the West the Advent excitement of 1843–44 in the Eastern States drew heavily upon its ministers and churches, and its estimated 325,000 communicants of 1844 have shrunk, from various causes, to not more than 150,000 in 1882; but the statistics of the denomination are in a very unsatisfactory condition. The figures given for 1844 are those of Elder Daniel Millard. In 1848, according to the *Christian Almanac* of that year, there were, instead of 1500 churches, only 875; instead of 1500 ministers, 926; and instead of 325,000 communicants, 28,892! The possible explanation is that Elder Millard included in his estimates the Disciples of Christ, and that the *Almanac's* reports were only partial. The fullest and most accurate returns in recent years are said to be those of 1874, according to which there were 1254 ministers, 1124 churches, 76,000 members, and 64 conferences. Since 1874 the *Christian Almanac* has omitted the statistical table, on the ground of the imperfect character of the official reports from the conferences. The number of conferences (in 1882) is 60, and Pres. A. W. Coan, of the American Christian Convention, estimated the number of communicants at 150,000. Of the 60 conferences, 1 is in Canada, 9 are in New
d. 10 are in the Middle States, and 40 are in
South-west. The ministerial list em-
200 ordained and 178 unordained min-
nber of churches is 975.
churches of the East and West bore

testimony from the beginning against slavery. Purviance, Stone, and other leaders in the West wrote and spoke against it, and advised those having slaves to make them free. This advice was generally followed, and probably few Christians in Kentucky and Tennessee were slaveholders in later years. In the South, however—Virginia and the Carolinas—the Christians, like other denominations in that section, imposed no restrictions, either on minister or layman, respecting slavery, and it was both patronized and defended. At the general convention of 1854, which was held in Cincinnati, it was thought some action ought to be taken on a question which was coming more and more into prominence, and a committee of three on anti-slavery was appointed. One of the three was the only delegate present from the South, W. B. Wellons. A majority report was brought in which declared that it was the "imperative duty" of the convention, representing the North, South, East, and West, to define clearly its position on this great moral question; and it recommended the adoption of resolutions denouncing slavery as the infringement of the rights of others and as tending to degrade men morally and mentally, and admonishing "our brethren of the South to wash their hands from this evil." After discussion these resolutions were adopted. It was furthermore declared that the Fugitive-Slave Law was contrary to the spirit of the gospel, and should be considered null and void. The Southern delegate, Elder Wellons, who had brought in a minority report, said he considered himself disfellowshipped by the action taken, and withdrew with several others. This gave rise to the SOUTHERN CONVENTION (see below).

In doctrine the Christians have generally been regarded as Unitarian because of their rejection of the Trinitarian view. Their true position, as claimed by Elder Badger in the *Christian Palladium* in 1834, was midway between the extremes of orthodoxy and rationalism. Taking the Bible as their guide and teacher, they find, as they think, distinctions plainly set up between the Father and the Son, and claim that the only rational view to be obtained from the Scriptures, taken in their natural meaning, is that Christ is inferior to God. As has already been stated, the founders of the denomination denied the doctrine of the Trinity, and held that there was but one supreme God, who alone is eternal, self-existent, and unchangeable. Christ, though divine and pre-existent, is neither supreme nor self-existent. Though higher than angels and men, he is not equal nor coeval with God. Though he made the worlds, it was as God's agent and by his power. His power is derived, and the time will come when he will yield up the kingdom which he now rules, so that God may be "all in all." These views are set forth fully in Kinkade's *Bible Doctrine*, one of the earliest and most valued theological works produced by the Christians. Kinkade held concerning the Holy Ghost that it "is something more than a mere quality; it is real being, and yet not a distinct person from the Father." While some of the early Christians may have taken a more advanced position on these doctrines in the midst of the exciting discussions of their time, the main body of the denomination held, and still holds, these views. Christ is the Mediator between God and man, the divine, only, and all-sufficient Saviour, and the Holy Spirit is the divine agent for the work of regeneration and sanctification. The doctrine of the atonement generally taught is that Christ's incarnation, death, and resurrection were not to appease God's wrath, to vindicate his justice, to satisfy the penalty of a broken law nor

to provide for the exigencies of moral government, but to show God's love and compassion and reconcile man to him. They do not hold that human nature is totally depraved. They "discard Socinianism and the mere religion of the intellect," and "unite to a large extent the light of reason on subjects of belief with the most earnest piety and zeal for the salvation of sinners, regarding in all discussions of sacred themes the Scripture testimony as final and supreme" (*Badger*).

The cardinal principles of the Christians are—(1) The Bible the rule of faith and practice; (2) the name "Christian" as scriptural and unsectarian; (3) Christian character the test of fellowship. The form of baptism is almost universally immersion. The system of church government is congregational. The annual conference is composed of ministers and lay representatives. It receives reports from all the ministers and churches within its bounds, and through standing committees examines into the character and qualifications of ministers; examines and ordains ministers; arranges the churches into pastorates; sees that every church is supplied with preaching; provides a course of study; and attends to the general interests of the churches. There are State conventions, including a number of annual conferences, in New York, Ohio, and Indiana. The general conference is styled the "American Christian Convention." It meets every four years, and is composed of presidents of denominational colleges, of conferences, and of State associations, and of ministerial and lay delegates from the various annual conferences. It has control of missionary, church-extension, education, publication, and Sunday-school matters.

In educational work the denomination has been backward. It was believed, in the first half century at least, that the ministry not only ought not to be so worldly-minded as to ask for or expect a salary, but that men of piety, zeal, and gifts were sufficiently qualified for service in the sacred desk without a special education. There were, indeed, during most of this period strong prejudices against an educated ministry. The first denominational college was founded as late as 1850, and it claims the distinction of being the first institution of the kind to open its doors to both sexes on equal terms. Antioch College, with Horace Mann as its first president, was the pride of the denomination, but after raising about $200,000 it was sold, though it was soon after restored. The trustees, however, transferred it to Unitarian control, on condition that it be endowed. The college is now again (it is situated at Yellow Springs, Ohio,) in the hands of the Christians. Union Christian College, Merom, Ind., was established in 1859. Fifteen years previously the Unitarians and the Christians had established a theological school at Meadville, Pa., which the latter patronized extensively, sending scores of students to it. They were represented in the faculty by David Millard from 1845 to 1867. In 1869 the Christian Biblical Institute, now located at Stanfordville, N. Y., was opened in connection with Starkey Seminary, and it has prepared about ninety students for the ministry. There is a literary and theological school for freedmen at Franklinton, N. C.

THE SOUTHERN CONVENTION.—The Southern Christian churches approved the withdrawal of their delegate, W. B. Wellons, from the general convention in Cincinnati, the reason for which is stated above, and in 1856 they organized the Southern Christian Convention. They had organized ten years previously the Southern Christian Association for the promotion of unity and co-operation. This biennial body now gave place to the convention. These churches differed from those of the North not only on the question of slavery, but in doctrinal matters, and a proposition to adopt a "Declaration of Principles" and to provide a better system of organization was made at this convention. Subsequently (1866) it was adopted, and the Declaration, with a system of government, was published and bound up with the denominational hymn-book. This action caused a division (1869), and several churches and ministers united with the Northern Convention. Wellons published a book in 1859 with the title *The Christians not Unitarians*. It declared that they were orthodox. The sections on doctrine in *The Principles and Government* declare, in the language of Scripture, the belief of the Church respecting the inspiration of the Bible, the relations of the Father, the Son, and the Holy Ghost, human depravity, repentance and faith, the resurrection, everlasting punishment, and eternal life. The Son is declared to be one with the Father, equal with God, mediator between God and man, head of the Church, heir of all things, judge of the world. Through his name alone is salvation. The mode of baptism is left to the choice of the candidate, and communion is not restricted, but is given to all who are "true followers of our Lord." The system of government is not strictly congregational. The quadrennial general convention, the last session of which was held in May, 1882, is the chief body. The convention *orders*, the annual conference *recommends*, the local church *advises*. The duties of churches and conferences are laid down in *The Principles and Government*, and directions are given, with forms, for the ordination of deacons and elders, the administration of baptism and the Lord's Supper, the burial of the dead, etc. The annual conference is composed of the ministers and lay representatives of the churches, and the general convention of ministerial and lay delegates elected by the annual conferences. Ministers can only be ordained or brought to trial by the annual conference. Provision is made for the prosecution of churches which neglect their duties or disregard their obligations before the conference. There are five annual conferences and about 14,000 members, chiefly in Virginia and North Carolina. The ministerial list embraces 56 elders and 18 licentiates. The oldest of the conferences, the Eastern Virginia, was organized in 1818, the general meetings having been previously held irregularly. The chief denominational schools are Graham College, Graham, N. C., and Suffolk (Va.) Collegiate Institute. A weekly paper, *The Christian Sun*, with other denominational literature, is published at Raleigh, N. C. A conference of colored Christians was organized in North Carolina in 1866. There are 33 ordained colored ministers in North Carolina and Virginia, and 7 unordained. Fraternal delegates from the Southern Christian churches attended the general convention at Albany, N. Y., in 1882. (H. K. C.)

CHRISTIAN UNION, THE, or perhaps more correctly THE CHURCH OF CHRIST IN CHRISTIAN UNION, is a denomination organized in Columbus, O., to unite all Christians on the basis of the Bible. The date of the first conference is 1863 or 1864, but the minutes of the Missouri Council for 1877 call that council the "thirty-third annual meeting." At the conference in Columbus, O., five denominations [illegible] Prominent among the min[illegible]rs were [illegible] Flack and J. F. Given. The [illegible] giv[illegible] the organization was that the denom[illegible]y [illegible] come too heavy, and men's "he[illegible]

the cruel intolerance and divisions of the sects." The new organization was characterized by strong objection to the recognition or discussion of political subjects. Its platform was no creed or written discipline, local church government. A General Council was organized in 1865 at Terre Haute, Ind., delegates being in attendance from councils which had been organized in Ohio, Indiana, Iowa, Illinois, Missouri, Michigan, Kansas, Nebraska, Wisconsin, Arkansas, and Texas. At present (1884) the denomination has two annual councils in Ohio, two in Missouri, and one each in Indiana, Illinois, Iowa, Kentucky, Tennessee, Kansas, Texas, Oregon, and Michigan, besides some churches in other States. The president of the General Council, Elder H. J. Duckworth, also editor of the weekly organ of the denomination, *The Christian Witness*, of Newark, O., estimates that the Church has over 100,000 communicants, 1000 churches, and 2000 ministers, but the number attending its council, is very small.

The principles of the Church are thus formulated: "The oneness of the Church of Christ; Christ the only head; the Bible our only rule of faith and practice; 'good fruits' the only condition of fellowship; Christian union without controversy; each local church governs itself; political preaching discountenanced." A fuller declaration of principles, appended to the minutes of the General Council (1882), contends that "all churches should be organized and governed as New Testament churches were;" that "every Christian giving scriptural evidence of his discipleship has a right to membership in any Christian Church on earth;" that immersion and episcopal ordination are not indispensable conditions to Christian and ministerial fellowship. A manual of church and council business adopted by the same council provides that each local church shall elect its own officers; that when two or more churches are united under one pastorate, the officers of each church shall compose the charge council, whose province it is to hear reports from the pastor and churches, licensed preachers, and Sunday-school superintendents, and decide questions on appeal from decisions of the churches; that three or more charges, not to exceed ten, shall form a district council, to be composed of the officers of the churches, an equal number of delegates, male and female, and the pastors and preachers, and to have power to decide appeals from charge councils and care for missionary and church extension matters; that the annual conference shall consist of the preachers and pastors within its bounds and delegates from the churches, shall require written reports from each pastor and various committees, including one on examination and ordination, and shall have charge of the general work within its limits; that a General Council, consisting of delegates, ministerial and lay, elected by the annual conferences, shall meet quadrennially and have jurisdiction over the whole country. In doctrine the Christian Union is evangelical; as to baptism, it practises both modes. (H. K. C.)

CHRISTISON, Sir Robert, LL.D., D.C.L., F.R.S. (1797–1882), an eminent Scotch physician and toxicologist, was born at Edinburgh, Scotland, July 18, 1797. His father, Alexander Christison, was professor of hu nity in the University of Edinburgh. The son this institution in 1811, and passed through rv and medical course, graduating in 1819. nued his medical studies at London and special attention to toxicology. He ian in Edinburgh, and in 1822 was prof of medical jurisprudence in the university. In 1832 he became professor of materia medica, which position he held forty-five years. He was twice elected president of the Royal College of Physicians, Edinburgh. In 1866 he received the degree of D. C. L. from the University of Oxford, and in 1872 that of LL.D. from the University of Edinburgh. He was physician in ordinary to the queen for Scotland, and in Nov., 1871, was created a baronet. He made frequent contributions to medical journals and published several books, of which the most famous is his *Treatise on Poisons*, which is a standard work on that subject. He died at Edinburgh, Jan. 27, 1882.

CHRISTLIEB, Theodore, D.D., Ph.D., a German evangelical theologian, was born at Birkenfeld, in Würtemberg, March 7, 1833. He was the son of a pastor, and studied theology at Tübingen from 1851 to 1855. He then spent a year at Montpellier, France, as a private tutor, and in 1856 became an assistant pastor in Würtemberg. Two years later he was called to Islington, London, to take charge of a German congregation, and built a church there. In the autumn of 1865 he was made pastor of the court church at Friedrichshafen, on the Lake of Constance, where the king of Würtemberg has his summer residence. In the winter of that year he delivered a series of discourses in the neighboring St. Gall, which were afterwards published under the title *Moderne Zweifel am Christlichen Glauben* (1868). This work gave him a wide reputation as a champion of evangelical Christianity. It has been translated into English, and published in Edinburgh and New York under the title *Modern Doubt and Christian Belief*. In 1868 he was appointed professor of practical theology in the University of Bonn, being also preacher to the university and director of the homiletical seminary. In 1873 he attended the meeting of the Evangelical Alliance in New York, and his essay on *The Best Methods of Counteracting Modern Infidelity*, read at that meeting, has been translated into most of the European languages. He is a prominent advocate of foreign missions, and assisted in founding the *Allgemeine Missions-Zeitschrift* (Gütersloh), which he still edits. He has contributed to Herzog-Plitt's *Real-Encyclopædia* articles on "Apologetics," "Homiletics," etc. Besides the works already mentioned, he is the author of *Leben und Lehre des Johannes Scotus Erigena* (1860); *Der Missionsberuf der evangelischen Deutschland* (1876); *Der Indo-Britische Opiumhandel und seine Wirkungen* (1877), which has been translated into English and French; *Der gegenwärtige Stand der evangelischen Heidenmission* (4th ed. 1880), translated into English under the title *Protestant Foreign Missions, their Present State* (London and Boston; 3d ed. 1881); *Zur Methodistischen Frage in Deutschland* (2d ed. 1882). Many of his sermons have been published both in German and English.

CHRONICLES, Books of. As to the date of these books, the article in the Encyclopædia Britannica calls attention to the fact that in 1 Chron. xxix. 7 the Persian term "darics" is used in giving an account of events which occurred in the time of King David. From this it is inferred that the book was written after Persian coin had been long current in Judæa. But the inference is almost equally strong that it was written before the close of the Persian period, that coin being still the standard. Use is also made of the genealogies in Chronicles and in Nehemiah to fix the date. In the article in this work on the Bible it is shown that taking the high priest Jaddua as the most extreme in-

See Vol. V. p. 613 Am. ed. (p. 706 Edin. ed.).

stance of this sort, the latest date in the genealogies is within the Persian period and within the probable lifetime of Nehemiah.

The position of the Chronicles as the last book in the Hebrew Bible must be taken as evidence that it was written the latest of the historical books. It is true that there is a unity between the books of Chronicles, Ezra, and Nehemiah, and that the books of Chronicles close abruptly at the point in the history where the book of Ezra begins. Many critics have inferred from this that the whole was first written in chronological order; that at some date after the writing of it the Israelite scribes detached the latter portion, now found in the books of Ezra and Nehemiah, and added it to the canon of Scripture, in order to supplement the history of Israel as contained in the books of Samuel and Kings; and that other scribes still later added the books of Chronicles to the canon. It is much more probable that the compiler of this line of historical books first produced the books of Ezra and Nehemiah to bring the history down to his own time, and afterward, finding himself still in possession of valuable materials, compiled a fresh history to cover the times from the beginning up to the period of which he had already treated—just as Josephus first wrote his *Wars of the Jews*, and afterward his *Antiquities*, and in modern times Hume began his *History of England* with the accession of the house of Stuart, but afterward went back to the invasion of Julius Cæsar.

This view of the motive for the writing of the Chronicles is certainly preferable to the view that some Levite, at some indefinite date after the establishment of the services of the second temple, set himself to rewrite the history, so as to authenticate the Pentateuchal ordinances, thus remedying what he regarded as the faults and deficiencies of the older books of Samuel and Kings.

Among these faults the critics who hold this view point out the "recording, and that without condemnation, things inconsistent with the Pentateuchal law." But the instances are mostly made out either by giving a mistaken meaning to the records contained in the books, or by assigning to the Pentateuchal laws an unnatural rigidity of intepretation, or by counting as the interpolations of a later hand the expressed and implied disapprovals of recorded violations of the law which now appear all through the books of Samuel and Kings.

It is further said that "The history of the ordinances of worship holds a very small place in the older record. Jerusalem and the temple have not that central place in the book of Kings which they occupied in the minds of the Jewish community after the Exile." But if any one will read in the books of Kings the account of the building and dedication of the temple, the accounts of the reforms under Asa, Joash, Hezekiah, and Josiah, of the desecrations or attempted desecrations by Athaliah, Ahaz, Sennacherib, and Manasseh, or of the coronations or burials of the successive Jewish kings, he will easily convince himself that the ordinances of worship and Jerusalem and the temple occupy an important and central place in those books, as really as in the writings produced after the Exile. The difference between the books of Kings and of Chronicles in these particulars is better described by saying that the Chronicles give relatively less prominence to the northern kingdom and its prophets, than by saying that the books of Kings give less prominence to Jerusalem and the temple.

The article in the ENCYCLOPÆDIA BRITANNICA says: "Long before the chronicler wrote, the last spark of prophecy was extinct." But while such men as Ezra and Nehemiah may not be prophets like Isaiah or Samuel, in the sense of having that character more prominently than any other, they yet were prophets, like Moses or David or Daniel, in the sense of being largely endowed with distinctive prophetic gifts. Ezra, the contemporary of the younger years of Nehemiah, appears to have also been, earlier in life, the contemporary of Haggai and Zechariah. Some of the prophets of this group may have been still living when the author of the Chronicles had reached manhood and had begun his historical researches. He must have been a contemporary of the generation of prophets and prophetic men to which Nehemiah and the writer of Malachi belonged. We must therefore regard the books of Chronicles as the final literary product of an age peculiarly rich in prophecy, and not as produced after the cessation of prophetic endowments.

The idea, therefore, that the books of Chronicles were written from a priestly point of view to supersede the older historical books, which had been written from the different point of view held by the prophets, is not very decisively favored, even by the internal evidences adduced by its advocates. On the other hand, if we distinguish between the prophetic and the priestly type of the religion of Israel, the priestly type was that which prevailed from Nehemiah to Jesus; and if the Chronicles had been written in the interest of this type of religion, and to counteract the possible heterodox influence of the older books, then the same motives would certainly have led to their being honored and used in preference to the older. But nothing of this kind happened. The books of Samuel and Kings continued to be the standard sacred history; prophetic lessons for synagogue-reading were selected from them. The books of Chronicles remained in such relative obscurity that it is a matter of dispute whether they are at all recognized in the New Testament. This is what we should expect if the purpose in writing them was mainly historical; that is, if they were written for the specific object of supplementing the other books, of utilizing materials which had been previously neglected, and thus of completing the historical Scriptures; but not at all what we should expect on the opposite theory.

An item of external evidence not to be despised is the Greek title of these books in the Septuagint version—*Paraleipomenon Basileon Iouda* ("Of the Omitted Affairs of the Kings of Judah"). The current tradition, substantially accepted by critics of all schools, is that a group of Israelitish scholars—among whom Ezra and Nehemiah were prominent—who lived during the Exile and after the Return, did some sort of work in collecting, classifying, and supplementing the sacred literature of the Jewish people. The book of Second Maccabees (ii. 13) cites a letter which purports to have been written 164 B. C., in which it is said of Nehemiah, "He, founding a library, gathered together the books concerning the kings, and prophets, and those of David, and epistles of kings concerning holy gifts." Without attaching too much weight to the authority on which this statement rests, it is every way probable that men of the group to which Nehemiah belonged would do precisely what is here ascribed to him. In their work upon the sacred literature of their nation it is a matter of course that they would gather what apparatus they could. It can hardly be otherwise than that their apparatus would include not merely the sacred books which had previously been written, but

also some of the sources from which the previous historical books had been compiled. They are likely to have had fragments at least of the old "Chronicles" of the kings of the two kingdoms or of extracts from them. They are likely to have had access to Assyrian, Babylonian, and Persian sources of history, such as are being now recovered from the monuments. As they used these in their work upon the older sacred literature, and in bringing the sacred history up to the date of their times, what could be more natural than that they should notice the existence of a considerable amount of material properly available for the writing of sacred history, but omitted from the older books? What more natural than that some one should have been led to utilize this material by writing just such a book as we have before us, repeating enough of the older narrative to show where the new materials belong, and inserting them in their places?

According to the other view, the writer of the Chronicles "had nothing to add to the Pentateuch, and the period from Moses to David contained little that served his purpose. He therefore contracts the early history into a series of genealogies." But an examination of the genealogies of the first chapters of Chronicles shows that they are not a mere abridgment of the history given in the older biblical books. Moreover, they are fragmentary and imperfect, and are interspersed with anecdotes and short narratives. If we suppose that the compiler of the Chronicles here set down whatever fragments of the ancient Jewish records of early genealogies had been preserved, either using or omitting such parts of this material as were found in the earlier sacred books according as it suited his purpose, and bringing some of the lists down to his own times, we have a supposition which accounts for the phenomena here apparent.

In regard to the historical value of the Chronicles the article in the ENCYCLOPÆDIA BRITANNICA differs widely from the opinions of the extreme destructive critics, who hold that the compiler had no historical materials of value except the older sacred books, and that his testimony to historical facts is therefore worthless. But, notwithstanding this difference, it groundlessly depreciates the historical value of the Chronicles. It affirms that "the book was throughout composed not in purely historical interests, but with a view to inculcate a single practical lesson." But is not the narrative of the book of Kings arranged for the inculcating of precisely the same practical lesson? Is not the question whether each king "did right in the eyes of Jehovah" the one to which especial attention is called? The author of the Chronicles certainly lived in different conditions of society from the authors of the books of Kings, and his point of view was somewhat affected by it. But it is only in a limited and comparatively unimportant sense that he can be represented as "presenting the history in quite a different perspective from that of the older narrative." In the main, his work is in the same spirit with that of the others, and for the same purposes. And there is not a particle of reason for insinuating that the practical aim of either the older or the later narrators ever led them to neglect historical truth.

In the Chronicles are used the expressions "ships to go to Tarshish," "ships going to Tarshish," "were not able to go to Tarshish" (2 Chron. ix. 21; xx. 36, 37), where the expression employed in Kings is simply "ships of Tarshish," the meaning in each case being "ships for long voyages." The expression is further varied in the addition of the Vatican Septuagint after 1 Kings xvi. 28, where it is "a ship for Tarshish (εἰς) to go to Ophir." It is sometimes assumed that the author of the Chronicles here shows his incompetence as a historian, in that he supposed that Tarshish ships meant ships that were actually bound for Tartessus. But nothing of this kind appears in his language. If "ship of Tarshish" means "ship for long voyages," then "Tarshish-going ship" may easily mean the same. "Were not able to go to Tarshish" (especially since the ships were broken before they started) may mean "were not able to make their long voyages."

In 1 Chron. xxi. 28–30 it is explained that David sacrificed on the threshing-floor of Ornan because the national altar of burnt-offering was then in Gibeon, and was rendered inaccessible by the sword of the angel. This statement is pronounced unhistorical, because "it is certain that at the time of David the principle of a single altar was not acknowledged." In proof of this is cited 1 Kings iii. 2–4 to the effect that "Gibeon appears only as the chief of many high-places." This chosen instance admirably represents volumes of argument that have been adduced for similar purposes. In the three verses the author of the Kings records the fact that Solomon and the people sacrificed in various high-places. But he regards it as a strange fact, needing explanation, for he explains it by saying, "because a house to the name of Jehovah was not yet built." Moreover, he regards the sacrificing at different places, even with this explanation of it, as illegitimate, and protests against it twice in the three verses: "only the people sacrificed," "only he sacrificed." The author of Kings is as distinct as the author of Chronicles in acknowledging "the principle of a single altar," and in holding that the contemporaries of Solomon ought to have acknowledged it. When the author of Chronicles assumes that David acknowledged it, he assumes something which is contradicted by no known facts, and in regard to which he, living twenty-two centuries nearer than our modern critics to the events, and having in his possession sources of evidence which they have not, is a better qualified witness than they.

If speeches like those of Abijah in 2 Chron. xiii. are mere literary devices, putting the author's words into the mouth of his hero, the statements thus uttered may none the less be historical truth. In this instance the assertions made by Abijah as to the tender age of Rehoboam when he began to reign present decided difficulties. They agree with the statement made in the Greek addition after 1 Kings xii. 24, that Rehoboam began to reign at the age of sixteen, but apparently contradict the statement of all the copies of both Kings and Chronicles, that he was forty-one at his accession. If we could prove that the unsettled condition of things after the death of Solomon lasted twenty-five years before the *simultaneous* accession of Jeroboam and Rehoboam, that would reconcile these statements. Very likely we should find them consistent if we had a full account of all the events of those times. Meanwhile, we may rest assured that if the author of Chronicles had invented these facts to put into the mouth of Abijah, he would have invented them free from such difficulties. Evidently, he found the statements of fact in some of the sources from which he drew, and repeated them as he found them.

It is true that the text of the Chronicles has been preserved with less care than that of the books which were more used, and contains a few evident errors of

transcription; but this is the extent of what can be proved as to the historical inferiority of these books.

Literature.—Important and accessible contributions to the literature are the translation of Zöckler's *Commentary* in Dr. Schaff's edition of Lange, by Dr. James G. Murphy of Belfast (1877), and the little work on the Chronicles published by Prof. Murphy (1880). The introduction in Zöckler's *Commentary* concludes with a full list of works on the Chronicles. (W. J. B.)

CHRONOGRAPH ("time-recorder"), an astronomical instrument invented in America in 1848 by Dr. J. Locke, though Prof. O. M. Mitchell, Joseph Saxton, and Sears C. Walker had much to do both with its invention and subsequent improvement. Its general introduction has inaugurated a new era in observational and instrumental astronomy. So accurate and permanent are its records, and so easily and minutely are they made, that it has become an indispensable instrument in every well-equipped observatory. It is of several varieties, and is chiefly used for the registration by electricity of the time of transit of any heavenly body across the meridian, instead of by the eye-and-ear method, as it is called, which required the observer's powers of attention to be distracted beyond what they are able to bear.

Before the introduction of this method (usually called the chronographic or magnetic method) the usual plan for noting the time of any celestial phenomenon was for the observer to listen to the beats of his sidereal clock; to keep count of the minutes, and estimate the space passed over by the object during the interval between the beats; to mentally divide this space into tenths, and record in his note-book the minutes, seconds, and tenths, meanwhile counting the clock-beats that not one be lost. All this must be repeated at the bisection of the object with each of the several wires (spider-lines) in the field of view of his telescope, sometimes as many as ten or more being employed. Even by this wearisome method skilled observers, after years of practice, have been able to record the time of transits to within one-tenth of a second, though it was more frequently to one-fifth of a second. But by the new plan an inexperienced person will, by a single night's practice, record them to one one-hundreth of a second. The chronographic, which has almost entirely superseded the old "eye-and-ear method," relieves the observer of all anxiety regarding the time, the clock-beats, and the making of the record in his note-book, and enables him to give his undivided attention to the observation of the transits, which, under the other method with its attendant difficulties, he was, to a certain extent, prevented from doing.

The most popular form of chronograph in use consists of a metallic cylinder some twenty or more inches in length and from eight to ten inches in diameter, made to revolve on an axis by a driving clock regulated to cause the cylinder to make exactly one revolution per minute. Around the cylinder is wrapped a sheet of blank paper which revolves with it, and upon which the records are made, the sidereal clock of the observatory recording its own time, and the observer his observations.

Three things are rigorously demanded in the successful working of a chronograph—viz., 1st, that the cylinder or disk (depending on which variety is used) be made to revolve uniformly once in a sidereal minute; 2d, that the standard clock makes an unfailing record on the paper once in a sidereal second; and, 3d, that the observer at the telescope shall have the power of electrically making a signal on the paper at the instant of the passage of any object across each of the several wires of his telescope. It is possible to quite perfectly accomplish the second and third conditions, but for the first no mechanical device has as yet been invented that will cause a cylinder to revolve with mathematical exactness for any great length of time. The deviations are, however, too slight to vitiate the results to any appreciable amount.

The pen (called the time-pen) is electrically connected by a wire directly or indirectly to the pendulum of the sidereal clock, which causes tracings of uniform length to be made on the revolving paper. Close to the time-pen is another called the observing-pen, which is electrically connected by a wire with a signal key within easy reach of the observer, who at every transit of an object makes the connection with his galvanic battery by tapping on the key, which instantaneously imprints a dot close to that made every second by the time-pen, which can be read and copied at leisure, and preserved and re-examined at any future time if necessary.

Both pens are attached to a small carriage which is slowly propelled lengthwise along the cylinder by a long revolving screw, so that the chronographic characters are recorded spirally around the cylinder. When the paper is filled a moment suffices to remove it and substitute another. Two or three blanks are sufficient for a night's constant work.

A straight line drawn on the sheet lengthwise of the cylinder will indicate the commencement of the minutes, or, as is often done, a time-signal may be omitted at the end of the minutes by removing one of the sixty teeth in the escapement-wheel of the clock, which breaks the electric circuit.

In some forms but a single pen is used, the clock marking signals that correspond to one second of time in length, and the observer using the same pen to record his observations. There is no difficulty in distinguishing the two sets of signals.

As far as theory is concerned, the instruments can be miles away from the observatory, and the clock and chronograph equally as far from each other.

The chronograph affords the easiest and most exact method known for determining the difference of longitude between two places connected by telegraph. Without going into the refinement of all the details, the process is briefly as follows: Suppose it be required to ascertain the difference of longitude between the Naval Observatory at Washington and the Dearborn Observatory at Chicago. All that is necessary is for the observer in the latter city to connect his chronograph with the sidereal clock in Washington by means of the telegraph-line between the two cities. The beats of the Washington clock are thereby recorded on the Chicago chronograph. The Washington observer signals the transit of a star across the wires in the field of view of his transit instrument, which are instantly recorded on the chronograph at Chicago. While the star is apparently moving towards the meridian of the last-named place the Washington clock is recording its own beats at Chicago, whose observer, when the same star passes the wires in his transit instrument, makes the record not only on his own, but likewise on the chronograph at Washington. The simple process of measuring up his chronograph sheet is all that is necessary to ascertain how much time has elapsed between the two records, which is the same thing as the difference of longitude between the two observatories. It must be remembered that by this process the star's right ascension and declination are not necessary to be known by either observer; all that is required being to measure the flow of time, which, re-

g from the earth's rotation, is uniform for all the . If the clock at Washington has no rate, and chronograph cylinder revolve with undeviating ac- and the exact time of the passage of the elec- ough the wires be known, a single trial will e the difference of longitude to within the one one- h of a second of time.

ce of error in recording transits by the eye- thod is the imperfection of the ear as an in associating its sensations with those of sight. s been computed that the precision of the associ- of sight and touch is to that of sight and hear- 17 to 10.

It is difficult to over-estimate the advantages which this invention has conferred upon astronomy, for it may be safely assumed that the value of a night's work with a transit instrument by the chronographic is about ten times as great as by the former method.

For facts regarding the priority of this invention see the two letters of Sears C. Walker to Prof. A. D. Bache (superintendent of Coast Survey), dated Dec. 15, 1848. printed as a public document by Congress in Jan., 1849.

A printing chronograph has been invented by Prof. G. W. Hough, and for three years was constantly and successfully used by him while director of the Dudley Observatory at Albany, N. Y. It possesses very decided advantages over all other forms of chronograph, the principal one being that no measuring up of the blanks, as in the recording chronograph, is required, as the observation signals are printed in Roman characters by type-wheels controlled by the standard clock. The probable error for a single impression is only 0·013 of a second, or the same as in other forms. The instrument, being somewhat complex in its mechanical construction, cannot be intelligently described here, but a detailed description may be found in vol. vii. p. 66 of the *Transactions of the Albany Institute.*

For descriptions of the different methods invented for breaking the electric circuit by a standard clock, and also the improvements made by Mr. Saxton and Profs. Mitchell and Walker, and for engraved sample of a chronographic record, together with many other facts directly and indirectly connected with the subject, see *Recent Progress of Astronomy*, by Prof. Elias Loomis, published in 1849. For a cut of the Greenwich chronograph, with description, see Lockyer's *Star-gazing*, pp. 260–266. (L. S.)

CHRONOLOGICAL TABLE. The following is a continuation of the Table in the ENCYCLOPÆDIA BRITANNICA, which closes with the year 1875.

See Vol. V. p. 625 Am. ed. (p. 720 Edin. ed.).

1876.—Jan. 1. The imperial bank of Germany opened. March 7. Jules Grévy elected president of French Chamber of Deputies; Prince of Wales returns to England from his visit to India. May 1. Queen Victoria proclaimed empress of India; 30. Abdul-Aziz, sultan of Turkey, deposed; Murad V. succeeds. July 1. Death of Michael Bakunin, founder of the Nihilists (born 1814); 2. Servians invade Turkey, but, unaided, are unsuccessful. Aug. 12. Mr. Disraeli created earl of Beaconsfield; Murad V., sultan of Turkey, deposed on ground of insanity; Abdul-Hamid II. becomes sultan. Nov. 6. Death of inal Antonelli (born 1806). Dec. 23. New con- uti proclaimed in Turkey, giving Christians polit- ity with Mohammedans.

rican.—Jan. 1. Centennial year of American ence opened with special demonstration at hia; 15. Telephone invented by Prof. Gra- l, of Boston. Feb. 17. Death of Rev. Dr. Bushnell, Congregational theologian (born 1802). March 2. W. W. Belknap, secretary of war, impeached by Congress. April. Headquarters of the United States army transferred from St. Louis to Washington; 17. Death of Dr O. A. Brownson, Roman Catholic philosopher (born 1803). May 10. Centennial Exhibition opened at Philadelphia. June 16. Republican National Convention at Cincinnati nominates Gov. R. B. Hayes of Ohio for President, and W. A. Wheeler of New York for Vice-President; 25. Massacre of Gen. G. A. Custer and his troops by Indians at Little Big Horn River; 29. Democratic National Convention at St. Louis nominates S. J. Tilden of New York for President, and T. A. Hendricks of Indiana for Vice-President. July 4. Centennial anniversary of American Independence celebrated. Aug. 1. Colorado declared a State by President's proclamation, its Constitution having been ratified July 1; 20. Death of M. C. Kerr, speaker of the United States House of Representatives (born 1827). Nov. 10. Centennial Exhibition at Philadelphia closed: 11. Presidential election. Popular vote: Democratic 4,284,885, Republican 4,033,950; Electoral vote: Tilden 184, Hayes 185; but there were disputes as to the result in South Carolina, Louisiana, and Florida. Dec. 4. Second session of the Forty-fifth Congress; S. J. Randall of Pennsylvania chosen speaker.

1877.—Jan. 15. The Great Powers present to Turkey their ultimatum on its affairs. March 1. Treaty of peace between Turkey and Servia. April 10. Turkey rejects the protocol of the Great Powers, signed at London March 31; 12. British troops annex the Transvaal republic; 16. Roumania makes a convention with Russia; 24. Russia declares war on Turkey. May 19. French cabinet (monarchical) formed under duc de Broglie, and the Chambers prorogued, 363 members protesting. June 21. Russians cross the Danube; 25. French Assembly dissolved. July 20 First battle of Plevna (second, July 30; third, Sept. 11). August. Convention between England and Egypt for suppression of the slave trade; H. M. Stanley reaches the west coast of Africa, having sailed down the Congo; Aug. 19–Sept. 17. Defence of Shipka Pass in the Balkan Mountains. Sept. 3. Death of Adolphe Thiers, French statesman (born 1797). Oct. 14. French elections result in a decided republican victory. Nov. 17. Kars, in Armenia, captured by the Russian general Melikoff. Dec. 10. Plevna taken by Russians under Gen. Totleben after a gallant defence since July 19 by Osman Pasha; 14. French cabinet (republican) formed under Dufaure.

American.—Jan. 30. Congress chooses an electoral tribunal of fifteen to settle points in dispute as to Presidential election. March 2. Election of R. B. Hayes as President confirmed by Congress. April 10 United States troops withdrawn from South Carolina State-house, and the Democratic State government recognized as valid; troops also ordered to be withdrawn from Alaska; 19. Presidential commission visiting New Orleans report a valid legislature and State government in Louisiana; 24. United States troops withdrawn from Louisiana Capitol. May 29. Death of J. Lothrop Motley, historian and diplomatist, in London (born 1820). June 15. Canadian and United States Fishery Commission meet at Halifax. July. Gen. O. O. Howard's campaign against the Indians in Idaho; 16. Serious strike of railroad employés commenced at Baltimore: it affected especially the Baltimore and Ohio and the Pennsylvania Railroads; 22.

Pennsylvania Railroad dépôt at Pittsburg burned by strikers; militia ordered out. Aug. 4. Railroad strike comes to an end; 16. Centennial of the battle of Bennington celebrated; 29. Death of Brigham Young, president of the Mormons (born 1801); his authority is assumed by "the Twelve Apostles." Oct. 15. Forty-fifth Congress met in special session; S. J. Randall speaker of the House; opposition to the administration developed in the Senate. Nov. 23. Halifax Fishery Commission awards $5,000,000 damages to Canada.

1878.—Jan. 9. Death of Victor Emmanuel II., king of Italy (born 1820); his son Humbert succeeds; 31. Cessation of hostilities between Russia and Turkey. Feb. 7. Death of Pope Pius IX. (born 1792; became pope 1846); 20. Cardinal Vincenzo Pecci elected pope, assuming the name of Leo XIII. March 3. Pope Leo XIII. crowned; Treaty of San Stefano concluded between Russia and Turkey; 28. Lord Derby resigns as foreign secretary in the English cabinet. May 1. International Exposition opened in Paris; 28. Death of Earl Russell, English statesman (born 1792). June 12. Death of George V. ex-king of Hanover; his son, Ernest Augustus, claims the kingdom. July 13. Berlin congress of representatives from Turkey and the six Great Powers divides Turkey and rearranges her affairs; 29. Austrian army enters Bosnia, and the occupation is completed Oct. 4. Aug. 21. Independence of Servia proclaimed. Monetary conference at Paris favors bi-metallism. Oct. 2. Failure of City of Glasgow Bank; liabilities, £10,000,000; 11. Austria releases Germany from the obligation, by treaty of 1866, to surrender the Danish part of Schleswig to Denmark; 12. Death of Bishop Dupanloup, French theologian (born 1802); 24. Death of Cardinal Paul Cullen, Irish theologian (born 1802). Nov. 21. British army enters Afghanistan.

American.—Feb. 16. Bland's Silver bill passed over the President's veto. April 12. President Hayes appoints a court of inquiry in case of Gen. Fitz-John Porter. May 13. Death of Prof. Joseph Henry, scientist (born 1798). June 12. Death of William Cullen Bryant, poet and journalist (born 1794); 19. Death of Rev. Charles Hodge, D. D., Presbyterian theologian (born 1798). July 11. President Hayes removes Chester A. Arthur from collectorship of customs at New York, and appoints Gen. E. A. Merritt his successor. August–October. Yellow fever rages along the Mississippi. Oct. 14. Marquis of Lorne appointed governor-general of Canada. Nov. 23. American minister in London paid the Halifax fishery award ($5,000,000) with protest. Dec. 17. Gold sold at par with legal-tender notes in New York for the first time since Jan. 13, 1862; 19. Death of Bayard Taylor, author and American minister to Berlin (born 1824).

1879.—Jan. 10. Death of Marshal Espartero, Spanish statesman (born 1793); 22. Battle of Isandlana, in South Africa; Lord Chelmsford defeated by the Zulus; 30. Marshal MacMahon resigns as president of France, and Jules Grévy is elected his successor; Gambetta is elected president of the Chamber of Deputies. Feb. 4. French cabinet formed under M. Waddington; 21. Death of Shere Ali, ameer of Afghanistan; his son, Yakub Khan, succeeds. April 28. Liberal Constitution adopted in Bulgaria; Alexander of Battenberg chosen prince. May 5. Death of Isaac Butt, founder of the Irish Home-Rule party (born 1813); 15. Death of Jacob Staempfli, formerly president of Switzerland (born 1820); 26. Treaty of Gundamak between England and Afghanistan, establishing "scientific frontier." June 1. Prince Louis Napoleon slain by Zulus (born 1856); 20. French Assembly and Senate order the seat of government removed from Versailles to Paris; 26. Ismail, khedive of Egypt, abdicated in favor of his son Tewfik. July 4. Lord Chelmsford defeats the Zulus under Cetewayo at Ulundi; 12. Germany adopts Prince Bismarck's Protective Tariff bill; 19. Baron Nordenskjöld sailed through Behring Strait, having accomplished the North-east Passage; 20. Jules Ferry's Education bill (anti-clerical) passed. Aug. 3. Russians evacuate Bulgaria; 27. Death of Sir Rowland Hill, the promoter of cheap postage (born 1795); 28. Cetewayo, king of the Zulus, captured by the British. Sept. 3. Massacre of English at Cabul. Oct. 8. Andrassy, prime minister of Austria, resigned; 13. English general Roberts enters Cabul and avenges the massacre. Nov. 10. Paris International Exposition closed; Prussian legislature authorizes the government to purchase private railroads. Dec. 21. M. Waddington's cabinet resigns; M. de Freycinet succeeds. 26. Conflagration in Tokio, Japan, destroys 15,000 houses; 28. Railroad bridge over the Frith of Tay, Scotland, blown down and train engulfed.

American.—Jan. 11. Death of Caleb Cushing, lawyer and diplomatist (born 1800); 26. Arrears of Pension bill becomes a law. March 1. Bill to restrict Chinese immigration vetoed; 15. Protective tariff adopted in Canada; 18. Forty-sixth Congress met in extra session; S. J. Randall of Pennsylvania chosen speaker of the House; 29. Death of Dr. George B. Wood, medical author (born 1797). March–April. "Exodus" of negroes from the Southern States to the West. April 6. Chili declares war against Peru and Bolivia; 21. Death of Maj.-Gen. John A. Dix (born 1798). May 24. Death of William Lloyd Garrison, the abolitionist (born 1804). July 1. Congress adjourned. Great difficulty had been experienced in passing the Appropriation bills, as Congress insisted on attaching conditions on account of which the President had vetoed successive bills. The Jeannette Arctic exploring expedition sailed from San Francisco. Sept. 26. Business part of Deadwood, Montana, burned. Oct. 13. Death of Henry C. Carey, political economist (born 1793); 17. Death of W. R. Whittingham, Episcopal bishop of Maryland (born 1805). Nov. 1. Death of Zachariah Chandler, United States Senator from Michigan (born 1813); 4. Elections in eleven States, generally favorable to the Republicans. Dec. 16. Gen. William Mahone elected United States Senator (1881–87) from Virginia as a Readjuster.

1880.—Jan. 20. Death of Jules Favre, French republican statesman (born 1809). Feb. 17. Attempt to assassinate Czar Alexander II. at the Winter Palace; 29. St. Gothard tunnel pierced through after eight years' labor. March 30. President Grévy orders the French Jesuits to disband. April 28. Mr. W. E. Gladstone prime minister of England a second time. June 16. Berlin conference of the Great Powers on the boundary of Greece and Turkey; 30. Jesuits expelled from their establishments in France. July 1. British House of Commons allows Charles Bradlaugh, an atheist, to take his seat without taking the oath; 11. French Government proclaims amnesty to the communists; 18. Tewfik, khedive of Egypt, signs the liquidation law, required by the bankruptcy of the country; 22. British Government recognized Abdurrahman Khan as ameer of Afghanistan, and withdrew its army from Cabul, but hostilities were renewed under

Ayoob Khan, July 27. Aug. 11. Gambetta's speech at the naval review at Cherbourg excited apprehension of war with Germany. Sept. 1. British general Roberts defeated Ayoob Khan at Candahar; Prince Bismarck takes the ministry of commerce and industry; 19. De Freycinet resigns as president of the French cabinet; Jules Ferry succeeds Sept. 22. Oct. 15. Celebration of the completion of the cathedral of Cologne (commenced 1248); 24. Captain Boycott compelled to leave Ireland by opposition of the people. Nov. Anti-Semitic agitation in Germany, especially in Berlin; 20. Death of Sir Alexander Cockburn, lord chief-justice (born 1802); 24. Dulcigno captured from Albanians by Dervish Pasha; 27. Dulcigno surrendered to Montenegro, which has thus a second seaport. Dec. 30,000 troops gathered in Ireland to repress the Land League agitation; 22. Death of Mrs. Cross ("George Eliot"), novelist (born 1820).

American.—Jan. 3. Death of Gilbert Haven, Methodist bishop (born 1821). May 9. Death of George Brown, Canadian statesman (born 1818); 27. Chilians defeated Peruvians and Bolivians at Tacna; Bolivia then abandoned the war. June 2–8. Republican National Convention at Chicago nominated Gen. J. A. Garfield of Ohio for President, and Chester A. Arthur of New York for Vice-President; 13. Death of ex-Senator J. A. Bayard of Delaware (born 1799); 23. Death of Dr. Constantine Hering, founder of homœopathy in the United States (born 1800); 24. Democratic National Convention at Cincinnati nominated Gen. W. S. Hancock of Pennsylvania for President, and W. H. English of Indiana for Vice-President. Sept. Convention of the Reformed churches (Presbyterian) in Philadelphia. Nov. 2. Presidential election: Popular vote, Garfield 4,439,415; Hancock 4,436,014; electoral vote, Garfield, 213; Hancock, 156; 8. Death of Col. E. L. Drake, who drilled the first oil-well in Pennsylvania; 11. Death of Lucretia Mott, Quaker philanthropist (born 1793); 17. New treaty concluded between United States and China, restricting immigration.

1881.—Jan. 21. Treaty between Russia and China defining their territory in Central Asia ratified at St. Petersburg. Feb. 3. Clôture adopted in the British House of Commons; 4. Death of E. Drouyn de Lhuys, French statesman (born 1807); 5. Death of Thomas Carlyle, philosopher and historian (born 1795); 25. British House of Commons passes the Irish Protection bill; 27. British general Sir G. Colley defeated and slain by boers at Majuba. March 13. Czar Alexander II. of Russia assassinated; his son, Alexander III., succeeded; 17. Irish Arms bill became a law; 24. British Government recognized the independence of the Transvaal republic; 26. Prince Charles proclaimed king of Roumania; Anti-Jewish riots at Kiev and other places in Russia. April 3. Earthquake in the island of Scio; 7000 lives lost; 19. Death of earl of Beaconsfield (born 1804); Lord Salisbury becomes the leader of the Conservative party in England; 25. French army invaded Tunis. May 12. French army having surrounded the city of Tunis, the Bey signed a treaty with France; liberal constitution of Bulgaria abolished by the king. June 14. Greece reluctantly ratifies a treaty with Turkey, annexing Thessaly and Southern Epirus; 27. Death of Dufaure, French statesman (born 1798). July 13. Riot at Rome at the removal of the body of Pope Pius IX. from St. Peter's to the special tomb in the church of St. Laurence; 18. Death of Rev. A. P. Stanley, dean of Westminster (born 1815). Aug. 22. Irish Land Law receives the royal sanction; it first passed the House of Commons July 29, but was afterward amended. Sept. 9. The Egyptian army, led by Arabi Bey, compel the khedive to form a national cabinet under Sherif Pacha. Oct. 13. Charles S. Parnell, leader of the Irish Home Rule party, imprisoned in Dublin; 20. The lord-lieutenant of Ireland prohibits Land League meetings. Nov. 9. Jules Ferry resigns his ministry; Gambetta succeeds, taking the portfolio of foreign affairs. Dec. 3. Italian Reform bill passed, granting votes to all who can read and write; 15. Turkey makes a settlement with its foreign bondholders; 25. Serious outbreak against the Jews in Warsaw.

American.—Jan. 17. Chilian army enters Lima. February–March. Great floods along the Ohio and Mississippi. March 3. Apportionment of House of Representatives fixed by Congress, allowing 319 members; 4. President Garfield's inauguration. April 18. Law passed restricting Chinese immigration for ten years. May 5. New treaty with China ratified by the Senate; 16. Roscoe Conkling resigns his seat in the United State Senate, but seeks re-election by the New York legislature. June 11. Arctic exploring steamer Jeannette crushed in the ice. July 2. President Garfield shot by C. J. Guiteau in Washington; 16. E. G. Lapham and Warner Miller elected United States Senators from New York to succeed Roscoe Conkling and Thomas C. Platt. Sept. 4. Immense forest fires in Michigan, 300 lives lost; 19. Death of President Garfield at Elberon, N. J. (born 1831); 20. President Arthur takes the oath of office privately, and again formally Sept. 22. Oct. 10. United States Senate meets in special session; 19. Centennial celebration of the battle of Yorktown, Va. Dec. 3. W. H. Trescott sent by the United States Government to induce peace between Peru and Chili; 5. Forty-seventh Congress assembled; Gen. J. Warren Keifer of Ohio elected speaker of the House.

1882.—Jan. 1. St. Gothard tunnel opened to traffic; 26. Gambetta resigns his ministry; De Freycinet succeeds Jan. 30. Feb. 8. Death of Berthold Auerbach, German novelist, at Cannes, France (born 1810). March 6. Servia becomes a kingdom, Prince Milan II. taking the title of King Milan I. May 6. Assassination of Lord Frederick Cavendish, secretary of state for Ireland, and Thomas Burke, assistant secretary, in Phœnix Park, Dublin; 25. The representatives of France and England in Egypt demand the removal of Arabi Bey. June 2. Death of Garibaldi, Italian patriot, at Caprera (born 1807); 11. Several Europeans slain at Alexandria; the rest seek safety on ships in the harbor; 18. Treaties between Austria-Hungary and Servia ratified. July 7. Death of Russian Gen. M. D. Skobeleff (born 1843); 8. France refuses to take part in the English intervention in Egypt; 11. British fleet bombards Alexandria; 12. Irish Repression bill becomes a law; 15. John Bright resigns from the British ministry on account of its foreign policy; 21. Gen. Wolseley placed in command of the British expedition to Egypt. Aug. 1. Celebration of the 500th anniversary of the annexation of Trieste to Austria; Industrial Exposition opened; 2. Arabi Pacha proclaims the khedive of Egypt a traitor and himself the true representative of the sultan; 15. Cetywayo, king of the Zulus, prisoner in London, allowed to return to Africa; 17. Insurrection in Corea and massacre in the royal palace, the king escaping; 20. The Suez Canal seized by the British troops. Sept. 1. In Russia, courses of medicine closed to women; 9. Arabi Pacha attacks

the English at Kassasin, but is repulsed; 11. Anti-Semitic congress at Dresden; Assembly of German Catholics at Frankfort-on-the-Main; Arabi Pacha defeated at Tel-el-Kebir, and British enter Cairo; 16. Death of Rev. Dr. E. B. Pusey, English theologian (born 1800); 18. Inundation on the Upper Danube; 25. Khedive of Egypt restored to power in Cairo. Oct. 17. Irish National conference at Dublin under C. S. Parnell; 31. Earl Dufferin sent to Egypt to assist in restoring order. Nov. 26. French Chambers sanction De Brazza's acquisition of territory on the Congo River; 27. Great floods along the Rhine, which continued during December. Dec. 3. Death of Rt. Rev. A. C. Tait, archbishop of Canterbury (born 1811); Arabi Pacha, condemned by court-martial, is banished to Ceylon; 6. Death of Louis Blanc, French historian and socialist (born 1813); 16. Changes in the British cabinet, H. C. E. Childers becoming chancellor of the exchequer; 27. In Austria, celebration of the 600th anniversary of the House of Hapsburg; 31. Gen. Wood's plan for reorganizing the Egyptian army is accepted.

American.—Jan. 4. Death of Prof. J. W. Draper, scientist and historian, in New York (born 1811). March. Great immigration of Jews from Russia; Report made to the Government that 85,000 persons have been rendered destitute by the Mississippi floods; 24. Death of Henry W. Longfellow, poet, at Cambridge, Mass. (born 1807). April 27. Death of Ralph Waldo Emerson, philosopher, at Concord, Mass. (born 1803). May 8. Bill to restrict Chinese immigration for ten years becomes a law. June 27. Constitutional amendment prohibiting liquor adopted by the people of Iowa; 30. Guiteau, assassin of President Garfield, hanged. Aug. 1. National Mining Exhibition opened at Denver; 2. River and Harbor Appropriation bill passed over the President's veto. August–October. Tariff commission visits various parts of the country. Oct. 24. Bicentennial anniversary of William Penn's landing celebrated in Philadelphia. Nov. 7. State elections highly favorable to the Democratic party, New York, Pennsylvania, Ohio, and Massachusetts being carried by them; 199 Democrats and 127 Republicans elected to Congress; 13 Democratic governors elected. Dec. 11. Death of Sir Hugh Allan of Montreal, in Edinburgh (born 1810). Business portion of Kingston, Jamaica, destroyed by fire.

1883. —Jan. 1. Death of Gambetta (born 1838); 5. Death of Gen. A. Chanzy (born 1823); 11. The foreign control in Egypt abolished, France protesting; 16. Prince Jerome Napoleon ("Plon-Plon") imprisoned for a futile manifesto; 28. Duclerc resigns the premiership of France, and is succeeded by M. Fallières. Feb. 5. Mr. Colvin is made financial adviser of the Egyptian Government; 8. Danubian conference at London enlarges the jurisdiction of the Danubian commission; 12. Coronation of King Kalakaua at Honolulu, Sandwich Island; Irish assassins of Lord Frederick Cavendish and Mr. Burke convicted on information of Carey, an accomplice; 13. Death of Richard Wagner, German composer of operas (born 1813); 16. In Russia, a commission appointed to investigate the Jewish question; 18. Fallières resigns the premiership of France, and is succeeded by Jules Ferry. March 7. Death of Rev. J. R. Green, English historian, at Mentone, Italy (born 1837); 10. Death of Comondourus, Greek statesman; 11. Death of Prince Gortschakoff, Russian prime minister (born 1798); 16. Death of Carl Marx, German socialist, founder of the International Society of Workingmen (born 1818) April 3. Congress of German socialists at Copenhagen, Von Bennigsen, German liberal leader, retires from public life; 10. Explosives act, passed in consequence of frequency of dynamite outrages in Great Britain, becomes law; 16. French vessels bombard ports in north-west of Madagascar; 19. Specie payment resumed in Italy. May. Pope Leo XIII. in a letter to the Irish bishops opposes the Parnell fund; 25. French defeated at Hanoi in Tonquin by the "Black Flags;" 26. Death of Abd-el-Kader, Arab general, at Damascus (born 1805); 27. Coronation of Czar Alexander III. at Moscow in the Kremlin cathedral; 29. James Carey, Irish informer, killed by O'Donnell at sea off the coast of South Africa. June 13. French Admiral Pierre bombards and captures Tamatave, in Madagascar; 16. British commission condemns project of under-sea tunnel from Dover to Calais; 20. Death of Bishop J. W. Colenso of Natal (born 1813); 28. British House of Lords rejects bill permitting marriage with a deceased wife's sister; 30. Prussian Landstag virtually repeals the May laws of 1873, which had been so obnoxious to the Catholics. July 28. Earthquake at Ischia, an Italian island, destroys Casamicciola; 3000 lives lost. Aug. 24. Death of Henri, comte de Chambord, head of the French Bourbons (born 1820); Comte de Paris, of the Orleans branch, succeeds to his claim on the throne of France; 25. French capture Hue, capital of Anam; 26. Great volcanic eruptions near Java; Mount Krakatoa submerged; immense loss of life and property. Sept. 1. French defeat the Black Flags near Hanoi, Anam; 3. Death of Ivan Tourguéneff, Russian novelist, at Bongival, France (born 1818); 11. Death of Henri Conscience, Flemish novelist, at Paris (born 1813); 28. Colossal statue of Germania, representing the new German empire, unveiled in the Niederwald. Oct. 20. Typhoon destroys large part of Manilla, in Philippine Islands. Nov. 10. Celebration of the 400th anniversary of the birth of Martin Luther, the German Reformer; Egyptian army under Hicks Pasha totally defeated by El-Mahdi in Soudan.

American.—Jan. 4. Gen. B. F. Butler installed as governor of Massachusetts; 20. Gen. Iglesias appointed president of Peru by a Congress at Catamarca with a view to peace with Chili. Feb. 4. Great floods along the Ohio River; Congress ordered the unexpended balance of the Japanese indemnity fund to be returned to Japan. March 3. G. F. Edmunds of Vermont chosen president of the United States Senate; 4. Death of Alexander H. Stephens, governor of Georgia (born 1811); 27. Insurrection in Hayti. April 4. Death of Peter Cooper, philanthropist (born 1791); 27. Irish Nationalist societies of America reorganize in Philadelphia, electing A. M. Sullivan of Chicago president. May 16. Treaty of peace concluded between Chili and Peru; 24. New York and Brooklyn bridge formally opened. June. Great floods in the Missouri and Mississippi Valleys; Gen. G. Crook crosses the Mexican boundary and destroys Apache camps. July 1. Reduced tariff goes into effect; internal taxes abolished except on tobacco and spirituous liquors; 4. Death of Archbishop J. B. Purcell of Cincinnati (born 1800); 16. Civil Service Reform goes into effect under a commission, D. B. Eaton chairman; 19. Strike of 12,000 telegraph-operators of the Western Union Company; 25. Centennial anniversary of the birth of Gen. Simon Bolivar, the South American Liberator. Aug. 1. Louisville Exposition opened by President Arthur. Sept. 19. Death of J. S. Black, jurist (born 1810).

Oct. 1. Postage on letters reduced to two cents on each half ounce; Ohio State elections give a Democratic majority of 10,000; Prohibition amendment defeated by 100,000 majority; 23. Lord Lansdowne installed as governor-general of Canada. Nov. 1. Lieut.-Gen. P. H. Sheridan succeeds Gen. W. T. Sherman (retired) in command of the United States army; 10. Elections give decided Republican majorities in the Northern States; 10. Centennial of Evacuation Day observed in New York; 18. New railway time standard adopted in United States. Dec. 3. Forty-eighth Congress meets; J. G. Carlisle of Kentucky elected speaker of House.

CHRYSANTHEMUM ("Golden Flower"), a popular name for certain plants of the order Compositæ, species of which have been introduced from China and Japan during comparatively recent times, the date in England being fixed at 1764. The name employed by Dioscorides when referring to what is known as *Chrysanthemum coronarium*, a bright-flowered species which abounds along paths and by roadsides in Greece. The Chinese plant was referred to *Matricaria* by Sherard, Ray, and others in the early botanists of the last century, who were familiar with dried specimens received by way of the East Indies, and it was subsequently referred to the genus *Chrysanthemum* by Linnæus and others as *C. Indicum*. Later botanists, however, refer it to the genus *Pyrethrum*, which differs from *Chrysanthemum* in having a membranous border to the angular, wingless achenes. There appears also to have been some misapprehension in regard to the name. Mr. Sabine, an English botanist, pointed out in 1823 that among cultivated chrysanthemums there were evidently two species. These are known to florists now as the "large-flowered" class, and the "small," or "pompons." The Linnæan plant was believed to be the latter, *C. Indicum*, while Mr. Sabine named the large-flowered species *C. Sinense*. Though cultivated at the Chelsea Gardens in England in 1764, and in the Low Countries as early as 1688 (if we may credit Breyne), it was not till plants were introduced to France by M. Blanchard of Marseilles in 1789 that modern cultivation properly began. He had three shades of color. Few persons, however, seemed to note that the plant produced perfect seeds under culture, and hence new varieties seldom appeared. But about 1846 attention to raising seedlings became general, till, in 1860, we find Salter, a florist, had 750 varieties, 250 of these being of the *Pyrethrum Indicum*, or "pompons," class. It is believed that up to the present time at least 1500 varieties have been raised and named by different cultivators. The small-flowered kind, *P. Indicum*, was reintroduced from China in 1846 by Mr. Robert Fortune, under the name of the "Chusan daisy."

In the wild form the ray florets are strap-shaped and the disc florets tubular, with fine regular teeth, much as in the common ox-eye daisy; but the florists have so developed them that there are numerous subclasses or sections, such as those which have flowers like the normal form, though in varied colors, which are called anemone flowers. Then there are those with tubular flowers changed to strap-shaped, as in the ray florets, with some curving upward, others downward, and some fairly horizontal. Some have the petals rolled up like quills. Again, there are classes founded on the edges of the corollas. Some have the strap-shaped florets deeply cleft, and the tubular ones have also forms more or less deeply lobed; and there are quilled ones, which have the apices flattened and presenting a spoon-like character. Much skill is also employed in growing the plants in different forms. Often several stalks are permitted to come up from the earth in the pot, and then neatly spread out by almost invisible stakes. Plants perfect hemispheres of four feet across are often thus obtained. Some train them as pyramids, others on fan-shaped wire trellises; but the great effort with the best cultivators is to get the finest plant possible from only a single stem in one pot. The plant is made bushy by judiciously pinching out the ends of the young shoots as they grow. They endure a considerable amount of frost in the Northern United States, but are killed by unusually severe winters; and their popularity is chiefly when employed as pot-plants for rooms and conservatories in late autumn and the early winter season of the year.

It is generally believed that, notwithstanding the proverbial gardening skill of the Chinese and the Japanese, European florists have far exceeded them in the improvement of the chrysanthemum during the half century they have given to the task. But perhaps we have not learned exactly what the Asiatics have done for it. Kæmpher, who wrote of Japan in 1712, notes that under the name of "kik" it was everywhere under culture in that country. In China it must have been grown for ages, as not only does it afford a general type of architectural ornament, but seems to have a place in the ancient history of this country. One of the national honors is the "Order of the Chrysanthemum." It is one of the badges of the Japanese empire. In Corea the annual Chrysanthemum festival is one of the greatest national holidays. The Coreans have brought chrysanthemum culture to great perfection.

The chrysanthemum is said also to be the national flower of Siam. (T. M.)

CHUCK-WILLS-WIDOW (*onomat.*), a fissirostral bird of the family *Caprimulgidæ;* the *Antrostomus carolinensis*, closely related to the whippoorwill (*A. vociferous*), inhabiting the South Atlantic and Gulf States. It is the largest species of the genus, about 12 inches long; the pointed wings, 8 or 9; the rounded tail, about 6; and distinguished from its congeners in the fact that the long bristles which fringe the deeply-cleft mouth are furnished with lateral filaments. The feet are extremely short and weak, as in all of the genus; the middle claw is pectinate, and the phalanges of the digits have the abnormal numerical ratio (2, 3, 3, 3 for first to fourth) of other *Caprimulginæ;* the head is broad and flat; the horny part of the beak is extremely small in comparison with the depth of fission of the mandibles. The plumage is remarkably soft and lax, and singularly variegated with black, brown, tawny, and fulvous, the brighter of these tints giving the prevailing tone; there is a white bar on the throat, and several lateral tail-feathers are tipped with white on the male. It is nocturnal in its activities, and in all respects its habits are similar to those of the better-known whippoorwill; the name, like that of the latter bird, comes of the attempt to express its uncouth cries in a word. (E. C.)

CHURCH. In the New Testament *ecclesia*, signifying "convocation," is the only single word used for church. It was the name given to the democratic governmental assembly of the citizens of Athens, duly convoked by proper officers, and possessing all political power, including even juridical functions. The word is used by the evangelists and apostles with several applications—

See Vol. V. p. 663 Am. ed. (p. 758 Edin. ed.).

sometimes of single assemblies, sometimes of the places of habitual resource for worship and preaching, and sometimes for all the congregations associated together in union, as in a city or province. It is also used simply to denote the whole united body of the faithful. It is then spoken of as a divine organization—viz. "the Church of God"—and called "the kingdom of God" "the kingdom of heaven," "my kingdom" by Jesus himself, and "the household of God." St. Paul describes the church as the body of which Christ is the Head, as the husband is the head of the wife, and, further, as the organic body of which his disciples are members in particular; "members of his body;" "the church which is his body, the fulness of him that filleth all in all." The original idea of the Church, therefore, contains several particulars: (1) It is an organism, and as such gives and nourishes the divine life. (2) It is an organization whose functions are disciplinary, defensive, and instructive. (3) It is a convocation, duly called, but voluntarily entered, and constantly open to free ingress or regress. There is yet another idea of the Church, modern in origin, but so prevalent as to constitute the common and most popular view of the Church entertained in America. This idea is philosophical, and will be considered later

The historical Church in America, must, of course, include all those aspects which are given to it in the New Testament. It must also be based upon "the foundation of the apostles and prophets, Jesus Christ himself being the chief corner-stone." The historical continuity of the Church, as a fact and a necessity, is generally accepted in America. Two distinct, and indeed antagonistic, schools of opinion, exist, however. They disagree as to what actually constituted the essence of the Church in the beginning, and they are divided upon all three of its distinctive points. Both agree that it is a spiritual body, but one so dwells upon the spiritual aspect that it regards the true Church as invisible even on earth; while the other regards its visibility as belonging to its essence, necessary both to its continuity and to the efficacy of its administration.

Under the second class may be placed the Roman Catholics, the Episcopalians, Moravians, Presbyterians, German and Dutch Reformed, and Lutherans. The first of these claim that to St. Peter was given supremacy over all the other apostles, and that the pope is the lineal descendant, in the episcopate of Rome, of St. Peter. They assert, therefore, that communion under the pope is necessary to membership in the Church of Christ. The others agree in rejecting this Roman claim, and in regarding the Church in America as necessarily continuous through visible transmission of authority. They differ as to one point essential for transmission. Episcopalians claim that the apostolic succession comes through bishops only, regularly ordained in unbroken line from the apostles' time to the present. The others hold that the apostles were not made a distinct and perpetual order in the ministry, but had an office which rested only upon the original twelve, with St. Paul, and came to an end at the death of St. John. Presbyters were at first, and are yet, they claim, the one divine order of the ministry that was intended to be perpetual in the Church. There are other Christian bodies in America holding a distinct, fundamental position, which are reserved for consideration when the philosophical idea of the self-evolute Church is discussed. They hold that the true Church even on earth is invisible, and they claim a right to exist, and act as parts of the living body of Christ, because of adherence to what they call the essential abstract truth of the gospel.

The historic churches—so designated for distinction's sake—claim visible continuity from the earliest Christian age to the present, and assert the necessity of this continuity until the end of time.

I. They agree in general that the Church is an organism, but a great variety of opinions prevail as to the functional operations of the organism. The authorized formularies of all declare that an actual personal union with Christ, the Head of the Church, is formally made by baptism, and that the one sacrifice is truly fed upon in the Eucharist. They differ, however, with one another, and even among themselves, in interpreting the meaning of their formularies. Those, occupying the extreme on one side look upon the sacraments as merely convenient badges and signs of the Christian profession, obligatory because divinely appointed; while those on the opposite extreme regard them as effective *ex opere operato*. Between these two extremes many various opinions are prevalent, and controversies, of course, are common.

II. While the historic churches agree in the position that a distinctive organization was given to the visible Church in the beginning, they differ as to the original form, the mode of its transmission, the seat of authority, and the extent of its powers. The extremes in these cases extend from the exclusive claims of the Papacy to that of a joint disciplinary authority vested in presbyters and people together, and acting through their conjoint concurrence. Among those that adhere to the Episcopal regimen, while rejecting the Papacy, the idea is common that bishops are the original depositaries, not only of the ordaining function, but of government also. The former belongs to bishops alone, although presbyters concur and join in "the laying on of hands" by which orders are conferred. Of government, however, the bishops retain exclusively only the executive portion, having admitted priests, deacons, and even laymen, to the legislative functions, and to some extent even to the juridical. Some hold that this right of legislation belonged to all orders of the clergy, with the laity, from the first. These appeal to the first Council in Jerusalem (Acts xv.), in which "the apostles and elders and brethren" exercised legislative and judicial functions. Those who adhere to the Papacy retain all the functions of ecclesiastical government in the hands of the bishops, subject always to the pope. Those who reject the episcopacy confine these functions to their ministers and elders. The ministers receive authority with their orders, which comes by regular transmission through some who have themselves been duly ordained. The elders are chosen by the members of settled congregations, and constitute, with the minister, the "session." This session has all governmental power—legislative, judicial, and executive—in the congregation, and is the source whence delegated power is given to the ascending gradations of presbyteries, synods, and assemblies among the Presbyterians, or of consistories, classes, and synods among the German and Dutch Reformed, and of synods among the Lutherans, etc. There is nothing in the defensive and instructive functions of the historic ecclesiastical organizations which is distinctively American. The usual public preaching is done by those in orders, though laymen often take part in occasional meetings for missionary and educational advancement, or in those called for moral and social improvement.

The historical churches recognize the convocational

cter of the Church, and hence regard it, in some cts, as a voluntary association, but not so as to away its primitive origin and consequent continu-y. They hold that membership in the Church is es-ntially voluntary where persons "have attained to s of discretion." Those who baptize infants re-them as church members, who should take upon nselves the baptismal vows when they reach the s of due understanding and judgment. Those who high views of the sacraments teach that the ized infant is, by the ever-present, unseen "Head all things to his Church," actually then and there y engrafted into himself and made a member . . dy. They rely upon the promise of his contin-presence, given at the institution of baptism. Even v. however, recognize the right and duty of voluntary nce of baptismal obligations, and provide for a tion both of the vows and the grace at an period of moral consciousness and sense of duty. who have not retained confirmation, as a definite ra rament, receive baptized persons to the com-nion upon examination as to faith and personal h an "experience."

Those who retain the episcopacy, and claim organic ity with the primitive Church catholic through an broken succession of bishops in and to the apostolic r. and yet deny the exclusive catholicity as well as claims of the Church of Rome, constitute two nent bodies in America and differ somewhat in ministration. Their popular names are Episcopalians Moravians.

Those generally called Episcopalians, but who in l language speak of themselves as "Church-recognize bishops, presbyters, and deacons as distinct orders in the ministry, and as having ir own governmental and ministerial powers, ts, and duties. The bishop has the oversight of a or of a defined missionary jurisdiction, presides io at all conventions, votes, or may give a cast-vote. The judicial functions of the bishop are d upon the fundamental idea of chief-pastorship. ver the pastors of the parishes, and is supposed a fatherly influence, and, where needful, ence in case of the trial of a clergyman the hop only can pass sentence, which he may do or not revision of the evidence. Trials are always be-re a court, in most instances appointed especially for though some dioceses have each a fixed and court. In every instance, however, a priest ried by priests, and a bishop by bishops. The of the brethren or "laity" to voice and vote in n are universally acknowledged. The clergy , in a governmental capacity, meet first in the which is a body politic as well as ecclesiastic, gnized by the State as a corporation. Its defined by both statute and canon law. Es-ally, it consists of two portions. The clergyman, or of a parish, has exclusive direction in spiritual and concurrent authority in temporals. The al affairs are administered by a vestry composed en and presided over by the rector. This laical is recognized in all diocesan conventions, which annually, and in the General Convention, which triennially. In diocesan conventions laymen sit chosen delegates of parishes in the same house ith clergymen, who sit by right of office, the bishop residing. In the General Convention clerical and lay eputies from dioceses or missionary jurisdictions form lower house, while the bishops constitute an upper house, wherein they sit by virtue of their office. There is no judicial system distinct from the legislative. Provision is generally made by canon for trial of a bishop or presbyter through specific courts appointed for specific cases as they arise, while certain methods and orders of proceeding are prescribed. Where, as in some dioceses, permanent courts for trial of presbyters exist, they are also fully governed by canons. Deacons are amenable to bishops only.

The laity are under the disciplinary authority of the rectors of their parishes, with appeal to the bishop, whose adjudication is final. They can, however, only be suspended from communion, and that solely for scandalous offences or for open enmity with one another.

Upon the whole, the position of the Episcopal Church in America is that of a body which claims historic continuity with the Church of all ages through the apostolic office perpetuated by the succession of bishops from the apostolic times, and possessing identically the same means of grace which, given by Christ in the beginning, are always accompanied by his effective personal presence, and made specifically effective to faithful receivers or partakers through the vivifying operation of the Holy Spirit ever present through Christ in the Church, which is his body.

While praying in their liturgy for the visible unity of the Church, and expressing commonly an earnest desire for its restoration, the Episcopalians do not generally favor any schemes for "evangelical alliance." The Greek Church, the Old Catholic, and by most the Moravian, are recognized as integral portions of the Church catholic, but the Protestant denominations are regarded as broken off from the organic continuity of the visible Church by their rejection of apostolic succession through the episcopal order. They fault the Roman Church for claiming papal supremacy and for additions to the Catholic Creed.

The Reformed Episcopalians are as yet a small body that seceded from the Episcopal Church, and held a convention first in New York, Dec. 2, A. D. 1873. George David Cummins, D.D., assistant bishop of the diocese of Kentucky, led the movement. Their distinctive peculiarity is an entire rejection of the organic idea of the Church, naturally accompanied with strong opposition to priesthood and the efficacy of sacraments. They hold that episcopacy is ancient and desirable as a form of government, but not of divine origin. Their bishops are without dioceses or defined jurisdiction. They exercise their office at large, and serve parishes as ordinary presbyters.

The Moravians, or United Brethren, do not differ materially from the same body in Germany and Great Britain. They are divided into three provinces, that in this country being the American. They retain the episcopate, with the orders of presbyter and deacon. The bishop administers a diocese, but has assistants or conseniors, who sit with the bishops in the "Upper House of Synod." A primate presides. The lower house is composed of the priests, though candidates for holy orders and other laymen are admitted to seats without votes. The American Provincial Synod meets triennially, and elects a body, called "provincial elders' conference," to administer government in the intervals between Synods. It has power to appoint ministers over parishes. There are four district synods, that meet annually. Over all is the General Synod of the three provinces, which meets every ten or twelve years in Saxony, and elects a body of twelve bishops and other

ministers, called "the unity's elders' conference," which exercises general supervision over the whole Moravian body.

The historic churches in America which reject episcopacy altogether, and hold to one order of ministry as established at first in the primitive Church, and since transmitted in unbroken succession, are the Lutherans, the German Reformed, the Dutch Reformed, and the Presbyterians.

The Lutherans do not differ materially from the same body in Europe. Swedish Lutherans seem to have been the first in this country. They settled at Wilmington, Del., A. D. 1638. Others from Germany settled in New York, in 1644. Still others, refugees from civil oppression and religious intolerance in Salzburg in Germany, settled in Georgia in 1734.

The first Lutheran Synod in America was organized in Philadelphia, Aug. 14, 1748, under the influence of Dr. Henry Melchior Muhlenberg, who had come from Germany upon urgent solicitation from the Lutherans in this country. Besides Dr. Muhlenberg, three German and two Swedish Lutherans composed this first synod. They "set apart" the first German Lutheran in America for the work of the ministry. The General Synod was organized Oct. 22, 1820, by delegates representing 135 ministers out of 170, and 33,000 out of 35,000 communicants. The Church grew slowly, and synods were established under the General Synod. After the late war between the South and North the Southern Lutherans came together, in what they styled the "General Synod of North America." In the North doctrinal controversies arose between the strict and liberal adherents of the Augsburg Confession. The Church, North and South, held a General Council in Fort Wayne, Ind., in November, 1867. Although divisions were not all healed, nor controversies terminated, the tendency among the Lutherans, like that among all the different Christian bodies in America, was from that time, and still continues, toward tolerance of differences and unity of action.

The German Reformed Church had a status in America early in the eighteenth century, having settlements in five of the Middle States, especially in Pennsylvania and Virginia. Under the influence of the Rev. Michael Schlatter, from St. Gall, Switzerland, the first synod or cœtus was organized in Philadelphia, Sept. 29, 1747, and placed under the direction of the Classis of Amsterdam. It remained thus until A. D. 1793, when an autonomous synod was organized, a constitution adopted, and the name taken, "High German Reformed Church." For some years the Church suffered for the want of educated ministers and from disorderly persons. The constitution was revised A. D. 1819, and the synod, which hitherto had consisted of one minister and one delegate from every parish, became a representative body. Its members were chosen by ministers and elders belonging to the classes. This has grown until the present order was fixed and settled. Now a *classis* is made up of the ministers and one elder from every parish within a given district. A *synod* is composed of delegates from four or more adjacent classes. The *General Synod* is a delegated body of ministers and elders from all the classes. These bodies are all both legislative and judicial. In case of trial every minister and member has the right of appeal from the lower to the higher courts. Their form of government is presbyterian. Every congregation has its "consistory," made up of pastor, elders, and deacons. Elders and deacons are chosen for *one*, *two*, or *four* years by communicant members of the congregation. They are first ordained, then installed. If not chosen again, they retain their ordination, but if elected again in the congregation they must be again installed.

In accordance with the corporate idea of the Church, they baptize infants and then carefully catechise and train them as already in the "body of Christ." Catechumens, when of proper age, are examined in presence of the elders of the congregation before receiving the rite of confirmation. This is conferred by presbyters, as the one only apostolic order retained and transmitted through the perpetuated organism of the one Church.

The Dutch Reformed Church, is also presbyterian in order, and is Calvinistic in doctrine. It first appeared in America at New Amsterdam (now New York), where its first church was erected in 1619. When the Dutch colonies came under British dominion the Church retained its position with a landed endowment which has since made it very wealthy. The Classis of Amsterdam exercised complete jurisdiction until about 1737, when a *cœtus*, a kind of lesser synod, was formed in America to meet yearly. Naturally, differences arose between those who wished for local liberty and those who wished to retain subjection to the authority of the mother Church. Through John H. Livingston, of New York, an adjustment of differences was effected, and a plan of union with the Classis of Amsterdam perfected about 1772. A General Synod was then organized in New York, with five subordinate classes. The doctrinal symbols were finally agreed to in 1792, and were adopted as the constitution of the Reformed Dutch Church in America. The constitution classifies the officers of the Church as—(1) ministers of the Word; (2) teachers of theology; (3) elders; (4) deacons. The ministers sign formularies declaring hearty belief and persuasion of the truth and authority of the theological standards, and promising to teach and defend them. Should doubts arise, they shall be submitted to the consistory of the proper parish, where liberty of conscience shall be respected and no judgment enforced arbitrarily. The abuse of this order is provided against by right of appeal. The office of the ministry is regarded as sanctifying the recipient for life, and setting him apart from all secular pursuits. The office of teachers in theology is given to presbyters by appointment of the General Synod, which is the supreme ruling body in the Church. Their work is that of professors in seminaries for theological or general instruction. They cannot hold a pastoral charge, though they may preach and assist pastors in public worship, and, with the consent of a minister and his consistory, administer the sacraments. Elders are chosen by the male communicant members of a congregation from among themselves. Their duties are general supervision of parish affairs, the examination and reception of communicants, maintaining discipline, and choosing delegates to the classis. They hold office for two years, half going out every year. Their number is left to the determination of each constituency. Deacons are chosen for two years, as above, and have care of the poor.

Every congregation has a primary assembly, composed of ministers, elders, and deacons, who have equal voices, and may elect to vacancies during their unexpired term of office. This body elects the minister. A separate legal board of trustees holds and manages the temporalities, and may contain members who are not church-members.

There are four gradations in the form of government:

(1) The *consistory*, or government of a single parish, which consists of the minister and all who are or have been elders and deacons. They elect one or more elders to represent the parish in the classis. (2) The classis, which is composed of ministers and at least one elder from each parish within its district. It has the right to license, ordain, install, dismiss, suspend, and depose ministers, to try appeals from consistories, and to exercise general supervision over all church affairs within its district within limits prescribed by the "particular synod." It must report annually to the particular synod on all matters affecting the temporal and spiritual condition of the churches. (3) The *particular synod* is the next superior legislative and judicial body. It meets annually, and is composed of four ministers and four elders from each classis. As a court of appeal it reviews all cases brought up from the classes. It has power to form new classes and to transfer congregations from one classis to another. It confirms the nominations made by the classes of delegates to the General Synod. The provincial synod of New York and that of Albany were set apart in 1800, that of Chicago in 1850, and that of New Brunswick in 1869. They now comprise about ten classes each.

The General Synod is the superior governing body over the whole Church. It is at present composed of nine ministers and nine elders from each particular synod, though every classis containing over fifteen churches is entitled to send one extra delegate for every five churches over the fifteen. Its sessions are annual and continue about ten days. It has a general supervision over the whole Church, and is a court of appeal of last resort. It may form new or change old particular synods. It corresponds with various assemblies of other denominations. It may alter the constitution upon recommendation of the classes, a majority of whom finally decide. It elects annually a board of direction of corporation, which manages the fiscal concerns and holds all the property of the Synod.

These three churches—viz. Lutheran, German, and Dutch Reformed—are rather distinct from than influential in the development and progress of what is peculiarly American in the current ideas and aspects of Christianity. They are German in tone, and are materially influenced by the condition of the German churches from which they sprung and with which they maintain close correspondence. They form an almost separate element in the midst of the American religious progress Like the Moravians, their weight and force, though great, are local, and they are more racial than national in character and tendency.

The Presbyterians proper in America, like their ancestors in England and Scotland, adhere to the Westminster Confession of Faith. This, together with the Larger and Shorter Catechisms, is commonly called the creed of Presbyterianism. There are several distinct bodies of Presbyterians, but they have all common characteristics and exert like influences in the progress of Christianity in America. Their points of difference are growing less and less. While visible corporate unity is, upon the whole, advancing among them, there is no very definite or persistent efforts to secure it. Indeed, the prevalence among them of the idea that the true Church is essentially invisible, known only to the Searcher of minds and hearts, causes them to desire visible unity rather for the sake of its manifestation to the world of Christian charity, than for any special faith in its necessity to the honor of God and the good of souls.

In ecclesiastical polity their position is, that there is one order only of ministers, originally called presbyters or elders, and that these have two functions—one of teaching and one of ruling. In common speech, as well as in the "Form of Government," the teaching elders are termed ministers, while the term "elder" is confined to individuals in that class who in separate congregations are elected and "set apart" as "the representatives of the people chosen by them for the purpose of exercising government and discipline in conjunction with pastors or ministers" (chap. v.). These constitute "the session." In fulfilling their functions the elders assist at the examination of candidates for baptism or for reception to communion, and give both opinions upon the fitness of candidates and votes as to their admission to what is called "full membership in the Church." These elders may be elected—one from each congregation—to sit in the presbytery, which is the first and lowest common legislative and judicial body. The ministers, residing within the limits of the jurisdiction of a presbytery, sit by right of office. The presbytery exercises careful supervision over its congregations, receives appeals from church sessions, examines, ordains, installs, removes, and judges ministers, and, in general, performs whatever governmental acts it may think expedient or necessary for the preservation of the faith, the promotion of order, and the securing of good conduct, with proper administration of affairs and of doctrine, in the congregations subject to it.

A synod is the next higher body. It consists of ministers and elders elected as representatives of the presbyteries. It has like extensive powers over its constituency. It receives appeals from, and reviews the judgments and even the records of, presbyteries, redresses whatever is contrary to order, erects new or divides old presbyteries, and endeavors to promote the edification of the Church. The synod meets, at least, annually. "The General Assembly is the highest judicatory of the Presbyterian Church. It represents in one body all the particular churches of the denomination." Upon the principle that the majority rules, which is fundamental in the polity of the Church, the General Assembly, as the highest body containing the concentrated representation of the whole Church, receives appeals as a court of last resort and exercises entire control over all church affairs. It is composed of delegates from the presbyteries, "styled commissioners to the General Assembly." It meets annually, is presided over by a moderator elected every year, who may have a casting vote or vote as a commissioner, but cannot have two votes.

Besides minister, or pastor, or bishop, which are different names given to the one office of "teaching elder," and the elders proper, every congregation may elect and set apart one or more deacons, whose special duty is to look after the poor and administer the temporal affairs of the congregation. These, as also the elders, receive an ordination from the pastor and the right hand of fellowship from those already ordained to the same offices. This ordination confers the orders of elder or deacon in perpetuity, but in recent years the exercise of office within the congregation depends upon periodical—generally annual—election by a majority of members of the church.

The one order of the Christian ministry to which Presbyterians adhere as the original and perpetual form

they claim is a historical and natural succession from the eldership in the Mosaic Church. They frequently compare the Christian church to the Jewish synagogue, and their teaching eldership to that which existed among the Jews from early times. The sacrificial worship of the temple at Jerusalem they assert was wholly typical. Hence, when the antitype appeared in the real sacrifice of Christ on the cross, the sacrificial worship formally ceased. Thenceforward acceptable worship of God was to be wholly spiritual, and the offerings of men were to be merely spiritual sacrifices. These spiritual sacrifices they describe and define as offerings by man's spirit, through the grace and power of the Holy Ghost, of penitence, faith, and obedience, expressed in words of devotion and exemplified in holy living. They reject the whole idea of a continuous Christian priesthood.

In entire consistency with their fundamental idea, that the synagogue alone was the true type of the Christian church, Presbyterians strenuously maintain and practically enforce the view that the primary and almost engrossing office and work of the ministry is that of preaching and teaching the word of God. Their ministry holds position in the very front rank of dogmatic theologians, and their people are remarkable for knowledge of, and firm adherence to, the Presbyterian faith. They have had divisions among them, but the tendency now is strongly toward reunion. The chief obstacles to this grow out of the conservatism of the smaller bodies on minor points of usage, a disagreement due to the civil war, and the rejection of distinctive points of Calvinism by the body called Cumberland Presbyterian.

The Presbyterian Alliance is a voluntary congress, in which Presbyterians, of all kinds and from all parts of the world, meet triennially. Religious and moral questions of all kinds are freely discussed. Papers upon assigned or chosen subjects are read by men of note and special standing. Fraternal intercourse is promoted. No votes, however, are taken, and hence no decisions are attempted.

The Roman Catholics in America have no points that differentiate them from the same Church in Europe. They adapt themselves, here as elsewhere, to their environment, but still claim to be exclusively *the* Catholics. Instead of setting themselves against liberty of conscience, they dispute priority with the Baptists in the declaration of religious freedom in America, on the ground that Lord Baltimore in Maryland proclaimed this freedom before Roger Williams did the same in Rhode Island. Their members are chiefly foreign immigrants, with their descendants. Converts are not numerous from native Americans, but when made they are generally from among the socially influential and educated classes. They adhere strenuously to what may be called the mediæval theology. Their disciplinary system is most efficient, the confessional being the means through which its judgments are formed and sentences imposed and enforced. It reaches every bishop through the pope, every priest through the bishop, and every layman through the priest. Though rigid in constitution, the Roman Church is flexible in operation. It wields a vast and growing power for good in the conservation of Christianity—after its own type—in America.

This completes the list of the "historic churches" in America—*i. e.* of those which make it a distinct and prominent point that there has been a manifest continuity of the visible Church from the beginning of Christianity, and that it will continue until the end of time. Many even in this list, not only in the prevalent opinions among ministers and people, but even in their formulas of doctrine, hold that the true Church is invisible, consisting of those who are honest and true members of Christ, but they all adhere also to the constant visibility of some witnessing body of Christ.

The Methodists form a society of Christians in America which began its career as a distinct ecclesiastical body in this country. It holds the intermediate position between the "historical" and the independent or congregational churches. It is largely episcopal in form, but essentially presbyterian in order. It claims transmission of the apostolic succession through presbyters, and not bishops. While it has adopted some of the marked features of the Episcopal regimen, as well as set up a distinct office held by bishops, it holds essentially the Presbyterian position, that there was but one order originally in the Christian Church, named interchangeably bishops or presbyters, which order is perpetuated in and through a succession of elders, to whom, *ex officio*, all ministerial rights and duties belong.

The origin of Methodism dates from November, 1729, when John and Charles Wesley, Whitefield, and others formed a religious society in Oxford, England, which soon attracted attention, in that age of Erastianism and coldness, on account of their grave and solemn demeanor and their zeal for promoting religion and good morals. The name "Methodists" was given them, partly in derision and partly in historical comparison. It described their fixed and regular habits of devotion, with persistency in all good works, and has become the name by which they are commonly known. John Wesley made efforts to keep the work and whole movement of the Methodists within the organization of the English Church. He even proposed to the bishop of London to ordain preachers for America. His efforts failed, however. Whitefield and Charles Wesley came to America, and the former especially preached with wonderful eloquence and effect. Whitefield was a strong Calvinist, while the Wesleys were both Arminian in doctrine. This led to a separation between them, and a division in their following both in England and America. The Wesleyan portion of the Methodist Church, however, so far prevailed that John Wesley has come to be the generally acknowledged head and originator of the whole organization. Indeed, his admirable talents as an organizer were such, that the ecclesiastical system he devised was accepted promptly, and has since continued without essential modifications. He remained a presbyter, having been ordained as had Whitefield also, by an English bishop. Still, he thought it necessary that the Methodist body in America should be under the control of an order that might exercise episcopal functions. He therefore himself, with the assistance of Thomas Creighton, an English clergyman, and others, ordained Thomas Coke bishop, or rather superintendent, and sent him to America to preside at the first General Conference, held in Baltimore in 1784. He directed that Francis Asbury, who remained almost alone in America during the Revolution, should be associated with Coke in the general superintedence of the whole body in this country. Asbury at first declined, but, being elected by the General Conference, was ordained. He was made deacon on the second day of the session, ordained elder on the third day, and on the fourth

e superintendent or bishop. John Wesley
. As our American brethren are now totally
ngled both from the state and from the English
chy, we dare not entangle them again either with
one or the other. They are now at full liberty
ly to follow the Scriptures and the primitive
urch."

veral divisions exist among the American Method-
. The slavery question divided them before the
war. Now, however, like all other religious bodies,
exhibit a strong tendency toward visible reunion,
as show a growing influence of reciprocal con-
ion, love, and charity. Some branches of this
nation have discarded the permanency of the
tendent.

The Methodist Protestant Church, organized in
ltimore in 1830, elects a president annually. The
esleyan Methodist Church, which was organized in
ica, mainly in opposition to slavery, in 1843, at its
neral Annual Conference elects a president for one
. The Free Methodists, organized in 1860, elect a
tendent for four years. The others, including
an Methodists, United Brethren (1800), and the
M. E. Church separated in 1816, have bishops
name and functions of office.

e preponderating body, the Methodist Episcopal
urch, the general conference is the superior legisla-
e body of the Church, and has great power. But it
not change the articles of religion, nor change its
constituencies, nor do away with the episcopacy
d the itineracy of ministers except on foreign mis-
revoke or change general rules of the united
A judicial conference exists for trials of
, and for hearing appeals from decisions of an-
ferences. Seven "triers" are elected by every
conference. The court for appeals consists of
seven triers of the conference in which the case
with seven other triers from contiguous con-
. The General Conference may review its
The trial of a bishop must be held before
from five neighboring conferences. The
conference consists of itinerant preachers only.
e of meeting is chosen by the conference, but
is appointed by the bishop, who presides.
body does not legislate, but administers discipline
its own members and makes careful inquiries into
e character and efficiency of every one. It gathers
and reports to the General Conference. The
nce includes the churches in a presiding
rict. It is composed of pastors, local
ers, exhorters, one steward, and one Sunday-
ol superintendent from every pastoral charge.
licenses local preachers, recommends them to the
neral Conference for orders or admission on trial,
holds jurisdiction over them. It also exercises
eneral supervision of temporal and spiritual affairs
thin the district.

The most strict and peculiar institution among the
ethodists is that of "class-leaders." Every parish
congregation is divided, if sufficiently large, into
veral classes, over each of which one man is ap-
ed as leader. He has a kind of subordinate
l charge over every person in his class. He
into and watches over his life and character,
pected to meet the whole class once a week
purpose of inquiries as to the personal religious
perience of its members, the giving of needful ex-
rtations, and the collection of contributions for
urch purposes and for other good objects. This, it
will be noted, constitutes an organization of great
power and great delicacy. There is hardly any as-
signable limit to the influence it may wield upon private
character, or to the force it may exert toward any
desirable end. The intimacy it causes, the knowledge
it gives to one another of the several capacities and
weaknesses of the various members, make it an engine
of great power when used by a skilful leader and
directed toward a given object.

Upon the whole, in respect to thorough organization,
reaching every member, and utilizing all forces and op-
portunities, the Methodist Church holds a most promi-
nent position among the religious and social powers in
America. The slavery question disturbed it, as it did
all other religious bodies, before the Civil War, and at
the time of the attempted secession of the Southern
States "the Methodist Church South" drew off and
set up its distinct organization, which still continues;
but on inferior political questions there has been no
denominational movement.

The peculiar work of evangelism, with which Method-
ism commenced its public career, has left its stamp
upon the whole development. From the beginning
evangelists have risen and labored signally all along the
line of church progress. Some have set themselves
squarely against some crying abuse, or worked to pro-
mote some specific good, while others have devoted
themselves generally to "religious revivals." The
leading idea, and consequent common practical
aim, of this whole religious organization is per-
sonal turning away from sin to holiness, from
the service of the world and of Satan to that of
Jesus. The tenacious and peculiar attachment of
Methodists to "their own Church" is the expres
sion of that strong social and religious, reciprocal, per
sonal communion which is their remarkable bond of
concord and most effective means of influence.

The Congregationalists proper, in America, are the
historical descendents of the old Independents of Eng-
land, who fled from persecution in England to Holland,
and thence came to the American continent, where
their first colony settled at Plymouth in Massachusetts
in 1620. The first colonists were men of stern mould,
and were guided by pastors of the same stuff as them-
selves, who knew well how to construct and conduct an
organization that was at once religious, social, and
political. The first apparent thought of the "Pilgrim
Fathers" on establishing themselves along Massachu-
setts Bay was that they had come into the wilderness
to obtain "freedom to worship God." Though they
themselves succumbed to the spirit of the age, and
became for a time persecutors of Quakers and Bap-
tists, it is certain that the principle of both political
and religious liberty was firmly established in New Eng-
land, and has extended through the whole progress of
that wonderful national development which character-
izes the American nation. Indeed, every formative
idea in our whole social and political evolution traces,
if not its origin, certainly its very early acceptance and
propagation, to the mind and energy of New England.

In church polity the Congregationalists take the
lowest fundamental position. Their underlying, germ
idea is, that conscious, spiritual membership in Christ
with communion through the Spirit in the love of God,
is the centre and source of salvation and of all good.
This must of course be personal, and can be known
only by personal experience. Whoever possesses this
experience is a "child of God," being bound to all
the duties of sonship and assured of all the privileges

honors, and blessings, both present and prospective, of the adoption into the "family of God." From this beginning the necessity of association leads on to Christian fellowship, and any number of these "adopted children of God" can form themselves into a society for the purposes of mutual edification, the observance of the sacraments and ordinances of religion, and the promotion of good works, missions, or whatever else the "cause of God" may demand. This association constitutes a true Church of Christ. They have ministers who perform pastoral duties, preach, administer the two sacraments of baptism and the Lord's Supper, and generally take the lead in acts of worship and works for general benevolence or for religious advancement; but the authority of the ministry is all derived from the suffrages of the congregation. The calling of the whole people is supposed to exclude the calling of a distinct order. In no other sense, are the Congregational ministers over the people in the Lord, than in that of delegates of the people chosen and authorized by the people to minister in holy things. The economic law of the division of labor is the ground of the existence and warrant for the support of the Congregational ministry. This ministry is not only for, but of, the people, and is directly amenable to the people. Although Congregationalists have a form, or rather custom, of ordination, wherein ministers from other congregations join in receiving and giving the right hand of fellowship, yet the authority to minister is received essentially from the consent of the congregation. By custom and courtesy a Congregationalist minister, once ordained over a church, retains his designation even when not occupied in official duties, yet no special grace of orders is supposed to remain in him.

It will thus appear that the very simplest religious element constitutes the ground, or rather the evolute germ, of the whole Congregational system or Church. It is not an ecclesia in any outward sense, for the acknowledged call is within, a spiritual voice from God responded to by the spirit of the man. There is no historic organization, constituted as a visible organism by Christ in the beginning and transmitted as such down the ages, but every church is simply a voluntary association of those who agree together in belief sufficiently to covenant together for common worship, the reception of a chosen minister, co-operation in missions and general good works, and for reciprocal spiritual, moral, and doctrinal advancement.

This, it will be observed, is the principle which has developed itself politically in the Constitution of the United States and in the national idea which governs the American people. The idea that all power is vested in the people, and that their voice carries authority because it is the appointed way for the expression of the voice of God, is the essence of Congregationalism. As far as it exerts a direct power upon the national mind it is earnestly religious. While teaching the right, dignity, and glory of personal liberty, Congregationalists also insist upon its responsibility. While acknowledging the right not only to change but to choose rulers, this right involves, and should be exercised under, personal responsibility to the God of nations, before whom peoples and persons stand ever open and accountable. A sense of this responsibility makes Congregationalism possible, and saves it from the disintegration which would follow merely personal judgment and self-assertion. The perfection of this responsibility, aimed at devoutly and approached in greater or less degree, is the ideal toward which Congregationalism is working up. The progress made is regarded by the members as favorable when compared with other church systems, while the prospect is, they think, brighter than any promised through religious bodies of other names. The history of Congregationalism in America shows the natural steps of progress from Calvinism to liberal Christianity, and exhibits, all along the way, some churches which rest on one or another projection from the side of this ascent or descent, and some yet rising or falling.

The Baptists, though congregationalist in ecclesiastical order and church principles, have maintained a remarkable consistency of faith and practice from the first. They have been bound together by one common article of religion. Indeed, it was, and more or less yet is, almost a point of faith among them that βαπτίζω carried always the signification "to immerse, to cover completely with water." Their agreement in this interpretation promoted agreement in other things, and, as they came into existence in what is called a comparatively orthodox period, they have as a body escaped those wide wanderings through the open fields of all possible belief which have distinguished other congregationalists. Their origin in this country is peculiarly interesting, because it was the first bursting forth, out of the dormant stem of Puritanism, of that religious liberty which has grown so large and strong in America. Roger Williams, the originator of the Baptist Church in America, was probably the first to proclaim this principle to the world in "these last days." He did not pretend to have discovered it, but only to have dug it up out of the burial of years and proclaimed it again as a true principle of Christianity.

Baptists require that all persons, before full admission to church membership, shall pass through a satisfactory personal religious experience. This "experience," "change of heart," or whatever else it is called, is regarded as the turning-point in the religious life. He who has passed through it is considered "converted," and by that conversion adopted into the family of God through personal spiritual regeneration. Having thus become a member of the "invisible Church," he has the right to admission into some visible Church. This right involves also a duty on the part of the convert "to come out from the world and be separate," which he should do by joining some visible ecclesiastical organization or "Church." Every one is left free to judge for himself, and choose what society or congregation he will join, but his application is passed upon and he himself examined by the pastor and deacons or a committee of the people. Indeed, it is common for these new converts to make public declaration of their experience. This view of conversion and this mode of propagating the Church are not peculiar to the Baptists exclusively. They are found essentially, though in varied forms, among all the Protestant denominations, and come from the fundamental idea so prevalent in America that the Church is invisible, and hence that the one important test of membership is personal assurance of spiritual new birth unto God.

The Baptists have won for themselves distinguished position through their successful literary and theological institutions, as well as through vigorous parochial work and earnestly-prosecuted missions both in domestic and foreign fields. They have run side by side with the Methodists, especially in the South, and have done remarkable evangelical work among the Americo-Africans.

They are divided into several sects—*e. g.* Seventh-

-Will, Free-and-Open Communion, Close-
, Disciples of Christ or Campbellites, and
ese hold fraternal relations with each other,
not intercommunion in all cases. They are
ional in polity. Though varying in beliefs
all strenuously adhere to the form of
n as ntial to baptism.

or, as commonly called, the "Quakers,"
ody whose idea of the Church is wholly
ible, spiritual body. They have neither
ood nor sacraments. Their organizations are the
necessary for the promotion of united
o and for the cultivation of general and per-
and religious growth or improvement.

ct to Christianity, as in respect to politics,
and all subjects of universal interest, America
its own distinct phase. If it fulfils its
, it will show more clearly and fully than
shown before, not only man's greatness
nity in the world, but also his eternal, noble
in the very presence of God.

progress of Christianity in America thus far has
olific in variety of manifestation, and noted for
roduction of every truth and every error which
Old World has been scattered along the centu-
The State does not recognize Christianity under
inite form. It leaves devotional forms to the
of chaplains, and the observance of its appointed
the free direction of the various religious bodies
ountry, which it refers to but does not distinctly

Public opinion is the great power in Amer-
has pronounced decidedly in favor of entire
liberty. The representatives of the great forces
are developing the Christianity of America all
pefully to the future. Whatever be its destiny,
ng is very evident: that America, as it is the
pen religious field that history has yet known,
rely contribute a definite chapter of its own to
chronicle which shall record the history of the
on earth. (B. F.)

RCH OF GOD, a small body of Baptists,
distinguished as "Winebrennarians," from
of their founder John Winebrenner. He
in Frederick co., Md., March 25, 1797. He
a minister in the German Reformed Church,
in 1820 over four congregations in and near
urg, Pa. Under his preaching a revival soon
and as this was an innovation on the established
f the denomination, the revivalist encountered
ion so strong that the doors of his churches
y shut against him, and the result was his
from the Church. This separation appears
taken place in 1825; and it was about this
at Winebrenner's views as to church govern-
anged. He continued his evangelistic labors,
ng in school-houses, market-places, or dwelling-
and "multitudes" of the German people lis-
The reasons which made it impossible for him
on his work in the Reformed Church also
desirable for those who had been converted to
emselves into separate churches. The first of
rganizations was formed in 1829 at the house
ew Miller, four miles east of Harrisburg. Jacob
alled the meeting, and invited Mr. Winebrenner

By request the latter preached on
organization and government of the
church was organized in accordance
he laid down, which were—(1) that
formed of Christian believers only;
(2) without a sectarian or human name; (3) with no creed and discipline but the Bible; (4) subject to no extrinsic or foreign jurisdiction; (5) governed by officers chosen by a majority of the members of each individual church. The church thus formed consisted wholly of people of German speech, and the denomination has drawn its constituency chiefly from Germans and their descendants. Several of the converts having become ministers holding views in accord with those of Mr. Winebrenner, it was deemed desirable to unite the various congregations in one fellowship; and the first eldership, or conference, was organized in Harrisburg in 1830. John Winebrenner was chosen speaker or chairman of this eldership, and he set forth in a sermon a plan for the co-operation of the churches; which plan was, in substance, adopted in four articles of agreement, six teaching elders subscribing to them. These articles declared—(1) that there is but one true Church, the Church of God; (2) that all God's people ought to belong to it, and to no other Church; (3) that it is right to associate together for the prosecution of the work of the Church; (4) that an eldership, consisting of teaching and ruling elders, should be held annually. For the title, "Church of God," authority was found in several places in the New Testament.

The new denomination did not extend itself rapidly nor widely. At the close of the first fifteen years of its existence (1845) it had 3 "annual elderships"—the East Pennsylvania (1830), the Ohio (1836), and the West Pennsylvania (1844)—93 ministers, 500 churches and preaching-places, and "about 100,000 members." Twenty-six of the ministers were in the Ohio eldership. In 1845 the ecclesiastical organization of the Church was completed by the constitution of the General Eldership, which meets triennially. Strong anti-slavery resolutions were adopted. The attitude of the General Eldership on this question caused, at the beginning of the war, the separation of the Texas eldership, the only annual eldership in the South. This eldership was received again as a member of the General Eldership in 1875. There has been but one distinctively German eldership, and this has been in a state of decline, some of its ministers and churches having left it and joined English-speaking elderships. The last meeting of the triennial General Eldership was held at Findlay, Ohio, in May, 1881, ten of the annual elderships being represented. The Church had in 1881 about 400 churches, 350 ministers, and 30,000 members. It has a book concern at Harrisburg, and publishes a weekly newspaper, *The Church Advocate*, and other periodicals.

The Church of God has no authoritative ritual, discipline, or creed, but the doctrines which it draws from the Scriptures, as defined by Winebrenner, may be thus summarized: It believes (1) the Bible to be the only authoritative rule of faith and practice; (2) in one Supreme God, consisting of Father, Son, and Holy Spirit, and that these three are co-equal and co-eternal; (3) in the fall and depravity of man; (4) in the redemption of man through the atonement of Jesus Christ; (5) in the enlightening, regenerating, and sanctifying influence and power of the Spirit; (6) in the free moral agency of man; (7) that man is justified by faith in Christ, and not by the works of the law or by works of his own righteousness; (8) in the necessity of regeneration, or the new birth; (9) in three positive ordinances of perpetual standing in the Church—viz., baptism, feet-washing, and the Lord's Supper; (10) that two things are essential to the validity of baptism—viz.,

faith and immersion—that faith should always precede immersion, and that where either is wanting there can be no scriptural baptism; (11) that the ordinance of feet-washing, according to the words and example of Christ, is obligatory upon all Christians, and ought to be observed by all the churches of God; (12) that the Lord's Supper should be often administered, and to Christians only, in a sitting posture, and always in the evening; (13) in the institution of the Lord's Day, or Christian Sabbath, as a day of rest and religious worship; (14) that the reading and preaching of God's word, the singing of psalms and hymns and spiritual songs, and the offering up of prayers are ordained of God, and ought to be regularly and devoutly observed by all the people and churches of God; (15) in the utility of holding fast-days, experience-meetings, and other special meetings of united and protracted effort for the edification of the Church and the conversion of sinners; (16) that the gospel ministry, Sabbath-schools, education, and all other benevolent causes ought to be heartily and liberally supported; (17) that the Church ought to relieve and take care of her own poor; (18) that the manufacture, traffic, and use of ardent spirits as a beverage or common drink are injurious and immoral and ought to be abandoned; (19) that the system or institution of involuntary slavery is impolitic and unchristian; (20) that all civil wars are unholy and sinful, and that in them the saints ought never to participate; (21) that civil governments are ordained of God for the general good; that Christians ought to be subject to the same in all things except what is manifestly unscriptural; and that appeals to the law out of the Church for justice and the adjustment of civil rights are not inconsistent with principles and duties of the Christian religion; (22) in the necessity of a virtuous and holy life, and that Christ will save those only who obey him; (23) in the visibility, unity, sanctity, universality, and perpetuity of the Church of God; (24) in the future personal coming and reign of Jesus Christ; (25) in the resurrection of the dead, "both of the just and unjust;" that the resurrection of the just will take place at the beginning, and that of the unjust at the end, of the millennium; (26) in the creation of new heavens and a new earth; (27) in the immortality of the soul, in a universal and eternal judgment, and in future and everlasting rewards and punishments.

The polity of the Church of God is Methodistic in some respects. The annual eldership corresponds to the annual conference, the General Eldership to the General Conference, of the Methodist system. The General Eldership, which meets triennially, consists of delegates from each annual eldership in the proportion of one teaching and one ruling elder for every ten members or fraction of ten. The speaker and two clerks of the General Eldership hold office three years. It controls all the common property of the Church and its publishing and mission interests; it elects editors of the Church press and boards of education, missions, and publication, and an executive committee empowered to remove officers of the General Eldership and fill vacancies between the meetings of the eldership; it has the exclusive right of establishing new elderships and defining their boundaries; it hears and decides appeals from decisions of annual elderships and of councils for settling difficulties between annual elderships. The constitution of the General Eldership also provides that no one shall be considered an accredited minister in the Church without a regular license; that the elderships shall renew these licenses annually; that no minister shall be transferred from one eldership to another without the consent of both bodies; that the itinerant polity of the Church shall be practised by the General Eldership in the employment of missionaries, no missionary to be appointed more than three years consecutively to the same charge. A board of incorporation, consisting of the officers of the General Eldership and members of its various boards excepting the board of education, holds all the property of the body.

Annual elderships are composed of the ministers and delegates of the churches within their respective limits. They license candidates for the ministry, renew licenses, provide a course of studies, receive from churches requests for preachers and appoint ministers to circuits and stations, and fix the boundaries of stations and circuits.

The churches are under the supervision of church councils, which consist of the preacher or preachers in charge and of elders and deacons. It has control of the public worship, of the examination and admission of applicants for baptism or membership, and of the discipline of members.

CHURCH, Frederick Edwin, an American landscape-painter, was born at Hartford, Conn., in May, 1826. He studied under Thomas Cole at Catskill, N. Y., and for many years he lived and worked in the Catskill region. Church made two visits to South America for the purpose of studying characteristic scenery, the first in 1853 and the other in 1857. The result of his South American experiences was a large number of canvases, of which The Heart of the Andes, The Andes of Ecuador, Rainy Season in the Tropics, A South American Landscape, Cotopaxi, and A South American River are among the most important. The Heart of the Andes was extensively used as an exhibition-picture, and it perhaps contributed more than any other one work to give the artist standing and popularity with the public. This picture is an extremely characteristic performance, and it is marked by all the merits and all the defects of Church's style. Although it does not profess to be a reproduction of any particular view, it does claim to be a faithful picture of the representative features of the region. The eye is carried from a tangled mass of rank vegetation in the foreground across a sun-baked plain to the huge snow-capped mountains. The different elements of the composition are delineated with fidelity, with the exception, perhaps, of the foreground, which is overlabored and seems more like a studied performance than any other portion of the picture; and the peculiar atmospheric effect aimed at is rendered with skill. The picture, however, although dealing with some of the grandest features of nature, fails to give an impression of grandeur or even of largeness. In this respect it is a typical work of the American landscape school, for the American-born and trained landscape-painters have from the first shown a greater predisposition for detail than for effect, with the result of belittling even large subjects. The same criticisms apply to Church's picture of the Icebergs, which was the result of a trip to the coast of Labrador made after his second visit to South America, and to his Niagara, painted some years later. Both of these celebrated works are very admirable in many respects. They are carefully and intelligently studied, dwelling perhaps with undue emphasis upon the iridescence of the icebergs and the rainbow which is sometimes seen at

but bearing the stamp of essential truthfulness, impressing the beholder with a sense of beauty. The Niagara is a panoramic composition—the word "panoramic" being used in a strictly technical sense—and the claim which has been made for it, that it is the best portrayal of the great cataract ever made, may fairly be allowed. Nevertheless, it is a pleasing rather than a great picture, for it does not express the greatness of its subject. It is a correct portrait of Niagara, which makes much of such a pretty incident as the rainbow, but which gives scarcely a hint of the irresistible power of the cataract. In 1866, Church visited Jamaica, and made sketches and studies which supplied him with material for several important pictures. In 1868 he crossed the Atlantic, and after a sojourn in England—where several of his pictures had already beeen exhibited with great success—he went to the Continent, and extended his tour to Greece and Palestine. The pictures of the Parthenon, Jerusalem, and some minor works were the result of this journey. At the Paris Exhibition of 1867, Church received a medal of the second class for his Niagara, and at the Paris Exhibition of 1878 he was represented by Morning in the Tropics and The Parthenon. Of the works of Church not mentioned above the most notable perhaps are Scene among the Andes, The After-Glow, El Khasné, Petrá, Evening on the Sea, Twilight in the Wilderness, A Tropical Moonlight, Chimborazo, and Jamaica.

CHURCH, PHARCELLUS, D. D., an American Baptist minister, was born at Seneca, N. Y., Sept. 11, 1801. He was educated at Hamilton, N. Y., and in 1825 was ordained pastor of a Baptist church in Poultney, Vt. He afterward had charge of churches in Providence, R. I. (1828–34), in Rochester, N. Y. (1836–48), and in Boston, Mass. (1848–54). Retiring from pastoral labors on account of ill-health, he was editor of the *Baptist Chronicle*, in New York City (1855–65). His chief publications are *Philosophy of Benevolence* (1836); *Religious Discussions*, a prize essay (1837); *Antioch; or, Increase of Moral Power in the Church* (1842); *Pentecost* (1843); *Memoirs of Mrs. Theodosia Dean* (1851); *Mapleton* (1854); and *Seed Truths* (1868).

CHURCH, SIR RICHARD (1785–1873), a British soldier, born in the county Cork, Ireland, in 1785. He entered the army in 1800, served in the Ferrol expedition and in Malta and Egypt, and afterward joined Murat's Neapolitan army. In 1814 and 1815 he held a commission in a Zantiote corps of rifles in the English pay. He was wounded at Santa Maura in 1812, made a C. B. in 1815, was knighted in 1822, and rose to the rank of general in the British army. In 1827 he went to Greece and entered the revolutionary service. He was soon appointed generalissimo of the united forces; but, though aided by Lord Cochrane with a fleet, he failed to save Athens from the Turks. He resigned the command in 1830, and soon after was ordered to leave the country, but this he would not do. In 1831, after the assassination of Capo d'Istrias, he again became generalissimo. After the kingdom was proclaimed he held various important positions in the ministry. He died at Athens, March 20, 1873.

CHURCH, RICHARD WILLIAM, D. D., an English clergyman and author, was born in 1815. After careful preliminary education he entered the University of Oxford, whence he graduated in 1836 with first-class honors. He won a fellowship in Oriel College, and still remains an honorary fellow. At once a student, a thinker, and an excellent writer, he has used his pen chiefly on topics connected with religion and morality. In 1854 he wrote a series of essays, two of which were afterwards expanded into a volume entitled *The Life of St. Anselm*. In 1869 he published a volume of university sermons on the relations between Christianity and civilization. His prominence as a sound scholar and eloquent preacher led to his appointment in 1871 as dean of St. Paul's Cathedral in London. In 1872 he published a dissertation on *Civilization Before and After Christianity*, and in 1873 *Some Influences of Christianity on National Character*. In 1874 appeared his *Sacred Poetry of Early Religions;* in 1877 (in the series of *Epochs of Modern History*) he wrote *The Beginnings of the Middle Ages*. His later works are a volume of sermons, entitled *Human Life and its Conditions* (1878), and biographies of *Spenser* and *Lord Bacon*.

CHURCH, SANFORD ELIAS, LL.D. (1815–1880), an American jurist, was born at Milford, N. Y., April 18, 1815. After receiving an academical education he studied law, and was admitted to the bar at Albion, Orleans county, in 1840. In the next year he was elected to the State legislature. In 1845 he was appointed district attorney for Orleans county. In 1850 he was elected lieutenant-governor of New York, and two years later he was re-elected. In 1857 he was elected comptroller of the State. In 1867 he was a prominent member of the State Constitutional Convention. In the Democratic National Convention of 1868 he received the vote of New York for President on several ballots. In 1870 he was elected chief-justice of the State court of appeals, and held this office till his death, which occurred at Albion, May 14, 1880.

CHURCHILL, RANDOLPH HENRY SPENCER, LORD, a British politician, second son of the seventh duke of Marlborough, was born Feb. 13, 1849. His mother was the daughter of the third marquess of Londonderry. He was educated at Oxford, where he took his Master's degree. In 1874 he was returned to Parliament for Woodstock, which he has since continued to represent. In the same year he was married to a daughter of Mr. Leonard Jerome of New York. He is also a justice of the peace and deputy-lieutenant for Oxfordshire. Chosen as a conservative, he was in 1880, and for some time after, the leader of the so-called "fourth party," consisting of a small number of extreme Conservatives who have greatly annoyed and embarrassed the Liberal government by their keen and persistent attacks. Later, while still maintaining a position among the Conservatives, he has shown a disposition to move on lines of his own choosing, and has manifested a desire to create a Tory-Democratic party.

CHURUBUSCO. See MEXICAN WAR.

CIALDINI, ENRICO, duke of Gaeta, an Italian general, born near Castelvetro, province of Modena, Aug. 10, 1811. He studied medicine at Parma and Paris. Having taken part in an unsuccessful revolutionary movement in 1831, he went into exile. He entered the Spanish service in 1835, fought against the Carlists, and attained the rank of lieutenant-colonel. In 1848 he returned to Italy, which was then in a state of revolution, and joined the army of Gen. Durando, under whom he fought against the Austrians. He served with distinction at Novara (1849), and for his services in the Crimean war was raised to the rank of brigadier-general in 1855. At the end of this campaign he was appointed aide-de-camp to the king, Victor Emmanuel. [illegible] nded a division at

Palestro in 1859, and became a general of division in June of that year. In the campaign of 1860 he defeated the Papal army under Lamoricière at Castelfidardo (Sept. 18). He was promoted in 1861 to the rank of general. He besieged Gaeta, which he took in February, 1861, thereby winning his title. He was elected a member of Parliament in the same year, and became a senator in 1864. He commanded an army in the war of 1866 against Austria, and was appointed chief of the royal staff. In November, 1867, he became commander-in-chief of the forces in Central Italy. He was sent as ambassador to Paris in 1876, and resigned that position in 1881, during the trouble caused by the invasion of Tunis by the French.

CIBRARIO, GIANN' ANTONIO LUIGI, COUNT (1802–1870), an Italian historian, was born at Turin Feb. 23, 1802. He graduated with the degree of doctor in civil and canon law in 1824, and became the intimate friend of Charles Albert of Sardinia, who employed him on diplomatic missions to Switzerland, France, and Austria. In 1848 he was sent to take possession of Venice as the royal commissioner, and was made a member of the senate. After the battle of Novara (1849) he went into exile. In 1852 he became a member of Victor Emmanuel's cabinet as minister of public instruction, and in 1855 was made minister of foreign affairs under Count Cavour. He became minister of state in 1860, and soon after received the title of count. He died Oct. 1, 1870, at Salo, near Brescia. He had at an early age distinguished himself by historical research, and throughout his career he devoted much time to literary labors. His first work was a sketch of the princes of Savoy (1825), which was continued in his *History of the Kingdom of Savoy* (Turin, 1840–47) and completed by his *Origin and Progress of the Establishment of Monarchy in Savoy* (Turin, 1854–55). He also wrote an able work on the *Political Economy of the Middle Ages* (1839), which has passed through several editions. His *History of Turin* (1847) and minor historical and biographical works exhibit the same diligent research and literary skill. He also published some novels of less importance, and edited several Italian classics. His last important work was a treatise on *Slavery and Serfdom* (Milan, 1868–69), in which he discussed particularly and at length the condition of agricultural laborers.

CIGAR. The rolling of tobacco-leaves into a convenient form for smoking without the aid of bowl and tube is due to the aboriginal Cubans. As the habit of cigar-smoking spread through the civilized world there sprang up a demand for an orderly arrangement of tobacco-leaves into marketable form in which shape, color, flavor, and free burning qualities were taken into consideration, and this led subsequently to the recognition of cigar-making as a handicraft. In no part of the world, however, has the cigar-making industry developed as in the United States. This development is best shown by the fact that during the past decade the increase in cigar production has been at the rate of 300,000,000 per annum, until it reached, during the fiscal year of 1883, the enormous amount of 3,227,888,900 cigars, with as many as 2000 cigar-makers employed in a single factory. The total number of cigar-makers employed during this same year was, according to the Cigar-makers' Labor-Union report, 75,000 men, women, and children. The United States census of 1880 puts the number of cigar-makers at 40,099 men, 9108 women, and 4099 children under sixteen years of age, making a total of 53,306. The chief centre of the cigar making industry of the United States is New York City. Here the annual increase in the number of cigars manufactured has averaged 50,000,000 cigars for several years, and reached 840,807,650 cigars during the fiscal year of 1883. The United States internal revenue bureau reports that the number of cigar-factories in actual operation in the United States during the same year was 16,663.

See Vol. V. p. 678 Am. ed. (p. 775 Edin. ed.).

The extraordinary development of this industry in the United States may properly be ascribed to three inciting causes: (1.) The protective tariff; (2.) The governmental internal revenue system; and (3.) The introduction of *forms* or *moulds* for shaping or fashioning cigars. (1.) The tariff laws have rendered the importation of cheap cigars—especially those of German make—impossible, and have restricted the importation of Cuban cigars to non-competing grades of high quality. It is claimed that cigars are now (1884) made in this country by Cuban workmen, and of Cuban tobacco, which compare favorably with the best imported brands. (2.) The governmental internal revenue system, by exacting a bond of $500 from each cigar-factory and $100 for each cigar-maker employed therein, and keeping a strict supervision of the raw tobacco material from the time it leaves the grower's hands until it reaches the consumer, thus necessitating the use of large capital in order to profitably manufacture cigars, has brought about the concentration of the industry in extensive factories. (3.) The introduction of the use of moulds has provided the means whereby the work in large cigar-factories can be properly subdivided, controlled, and the product rendered uniform. This method of making cigars is generally known as *mould-work*, in contradistinction to *hand* or *Spanish work*. The idea of compressing tobacco into the shape of a cigar by means of a mould originated in Germany. The material first used for moulds was stone, in which *cups* or *matrices* in the shape of a cigar were roughly hollowed out, into which the tobacco was pressed. The tobacco thus treated and shaped is termed a *bunch*. At present stone has given way to wood, and through the perfection of manufacture the wooden mould is so wrought that creases, wrinkles, and joint-marks are rendered impossible. The *bunch* consists of *filler* and *binder*. The filler, being first laid perfectly straight in the hand, is then held together by the binder, and is placed in the mould, where it is kept for several hours under pressure, and comes out in cylindrical form. This operation is termed *bunch-making*, and the operatives engaged in it are called *bunch-makers*. The next operation is to encase the bunch in the outside leaf, called *wrapper*, and to give the finishing touches to the *point*, or *head*, and to the *tuck*, or *end*, of the cigar. This is done by the *rollers*, or cigar-makers proper. It will be readily perceived that the mould system of manufacture admits of the examination of each part of a cigar at every step of the process; besides which, it has the additional advantages of readily ensuring the desired shape, great economy in material, and the promotion of perfect combustion in smoking, this latter being a matter of paramount importance. Incongruous as it may seem, there are *fashions* in cigar-making which decide the style or shape of the cigar. There are, by actual count, no less than 2317 different shapes of cigar-moulds, varying in length from 2½ to 7 inches, in existence at the present time, and their number is constantly increasing.

The Spanish mode of making cigars still retains its

primitive simplicity. The cigar-maker simply rolls one tobacco leaf over the other, dextrously forming with his hand the shape of the cigar as he proceeds, and finally places a wrapper around the whole, which in this instance takes the place of the binder. In hand, or Spanish, work only one grade of material is used throughout the entire cigar, care being taken only to select a fine-appearing leaf for the wrapper; while in mould work the filler, binder, and wrapper are generally of different kinds of tobacco.

The nature of the soil upon which tobacco is grown determines its availability for cigar-making. Tobacco grown in Maryland, Virginia, North Carolina, Kentucky, Missouri, and some parts of Ohio is too strong for cigars, and is almost entirely used in the manufacture of chewing and smoking tobacco. The Connecticut Valley, Massachusetts, Vermont, New York, Pennsylvania, Ohio, Illinois, Indiana, and Wisconsin, however, produce cigar-tobacco of excellent quality. It is called *seed-leaf*, to distinguish it from varieties grown in the same region of country from Havana and other imported seeds. The native or seed-leaf is used principally for fillers and binders, while the *Havana seed* is used for wrappers. Within the last five years a tobacco grown on the island of Sumatra, in the Dutch East Indies, has been imported into this country and is being largely used for wrappers. Cigar-tobacco from Mexico, San Domingo, Java, and Manilla is also brought here, but only in insignificant quantities.

Next to securing perfect combustion, the appearance and the color of the cigar are matters of the greatest importance to the manufacturer. Great skill has been displayed by manufacturers in giving the desired color to cigars by natural processes. The tobacco, after it has been cut in the field, is cured in sheds by the farmer, and after one year's fermentation in his hands is ready for market. The cigar-maker then *re-suceats* it, and by subjecting it to repeated baths of dry steam produces the desired rich dark color. It is then placed away for use, and as wanted is moistened, or *cased*, with water. Americans demand dark-colored cigars, while Europeans generally prefer light colors. Cigar colors range from *claro*, light; *colorado*, medium; *maduro*, dark, to *oscuro*, very dark or black. The colors are still further defined for intermediate shades as *claro-colorado*, *colorado-maduro*, etc., and the nicest regard is paid to the sorting of these colors prior to packing them in boxes. Sorting and packing are recognized branches of the cigar-making handicraft. Due attention is also paid by American manufacturers to obtaining desired *flavors*, and this is accomplished by the blending of tobaccos of different growth until the best combination is attained. The tobacco grown on the island of Cuba is, however, conceded to excel in aroma, and nowhere else has the soil produced such exquisite flavor as that from its Vuelto Abajo.

Many machines for cigar-making have been patented, but none have thus far achieved any marked success. In the production of the finer grades of cigars the cigar-making by hand will remain supreme, since human fingers are most adequate for the delicate task of manipulating the fragile leaf. (See TOBACCO, in AMERICAN AGRICULTURE, Vol. I. p. 120.) (A. F. H.)

CINCHONA. About 1820 a Brazilian surgeon called the attention of his countrymen to the anti-malarial virtues of certain small trees or shrubs which grow in that country. St. Hilaire grouped them with the true cinchonas, but by De Candolle they were erected into a distinct genus, *Remijia*. In 1857 a new cinchona-bark —the so-called cuprea-bark—began to appear in the London markets, and within a few years the annual supply has become enormous. It is a very hard bark, with a short not fibrous fracture, and is distinguished microscopically by its bast-cells being small, with their cavities wide open; in all of the true cinchonas the bast-cells are very large and have their cavities obliterated by numerous secondary deposits. Cuprea-bark yields as much as 2 per cent. of quinine in a very pure condition, owing to the absence of inferior alkaloid. In it has been found a hitherto unknown alkaloid, homoquinine or ultraquinine; but there is reason for believing that this is a double salt of quinine and quinidine. The Remijias abound in two distinct regions of South America. One is the lower part of the basin of the Magdalena River, where the trees grow in the mountain-range of La Paz; the other is the valley of the Orinoco, among the mountains which are the eastern branch of the Cordillera of the Andes. The commercial value of the bark is very great, and, as the genus is indigenous to a dry country not much above the level of the sea, it is very probable that some of the species could be successfully cultivated in certain parts of the United States. (H. C. W.)

See Vol. V. p. 662 Am. ed. (p. 780 Edin. ed.).

CINCINNATI, the largest and most important city of Ohio, and the county-seat of Hamilton county, is the eighth city in size in the United States. It is situated in the S. W. corner of the State, lat. 39° 6′ N., long. 84° 26′ W., on the N. bank of the Ohio River, nearly midway between its head and mouth.

See Vol. V. p. 663 Am. ed. (p. 782 Edin. ed.).

The ground on which the city stands belongs, geologically, to the formation known as the Cincinnati group. The hills which are included in the corporate limits rise to an elevation of from 400 to 465 feet, and are made up of alternate layers of clay and blue limestone. The valley at the foot of these hills is composed to a considerable depth of clay and gravel deposits from the river-bed. A gravel-bed underlies nearly the whole city, forming an admirable natural drainage. The blue limestone of the hills is a very beautiful building material, and it can be quarried in inexhaustible supply. The bluestone houses in the suburbs are among the handsomest residences in the United States. The site of Cincinnati is extremely picturesque. The views of natural scenery from its hills are scarcely surpassed in beauty. The district in which is the densest population lies in a basin entirely surrounded by hills. These part from N. E. to S. W. to admit the passage of the Ohio River, which flows between them in a double curve. Opposite the city, in Kentucky, is the mouth of the Licking River. Crawfish, Deer, and Mill creeks are the names of small water-ways flowing through the city into the river. Deer Creek has, however, been encroached upon by the growth of the population till it has nearly disappeared. The most thickly inhabited portion of the city occupies a district about 2½ miles in length and 1 to 2 in width, between Mill and Deer creeks. Cincinnati is built upon three natural terraces. The first, known as "The Bottom," is nearest the river, and is some 60 feet in height. Along this plateau are located the large wholesale houses and many manufacturing establishments. Much of the wealth of Cincinnati is invested here. The second plateau, extending back towards the hills, is 112 feet high. The third terrace is the hills themselves, up which the city has climbed and over which it is rapidly extending. The heights are reached by horse-cars and by four in-

clined-plane steam railways. One has a freight- and wagon-elevator, besides that of passengers, and another conveys street-cars with horses attached bodily up the hill. The hilltops at the head of the inclines are popular summer resorts. Even in periods of extreme heat they are cool and breezy. The climate of Southern Ohio is excellent in sanitary respects, and Cincinnati is one of the healthiest cities in the Union, its annual death-rate being 19·20 to 1000. The average summer temperature is 75°·24; the winter temperature, 34°·28; the yearly mean, 54°·72.

By the census of 1880 the population of Cincinnati was 255,139. The ratio of voters to the population, as shown by the Presidential election of 1880, is 1 in 4·8. The city has, however, grown with such rapidity within a few years that the population is now estimated from the school census of 1882 at 280,000. Including Covington and Newport (in Kentucky) opposite Cincinnati, there are some 350,000 souls in the hill-rimmed basin through which the Ohio River flows at this point. Of the 255,139 persons composing the inhabitants of Cincinnati in 1880, the native-born population was 183,480; white, 175,352; colored, 8128. The foreign-born population was 71,659. Natives of the German empire, 46,157; of Ireland, 15,077; total Great Britain and Ireland, 19,202. Persons above ten years unable to read, 7121; persons above the age of fifteen unable to write—males, 3052; females, 5106; total, 8158. Of these 2068 were colored; males, 936; females, 1132.

Architecturally, Cincinnati and its suburbs have been much improved and beautified within recent years. Building interests have manifested remarkable activity, and even the floods of 1883 and 1884 eventually intensified this activity. During 1882 the products of the various building trades amounted to $25,524,240. The residence flat system has been introduced. Large and handsome blocks, with business establishments and offices on the lower floors and suites of light, commodious living rooms above, are common in the most thickly inhabited portion. Houses in the valley are built of brick, often with fronts of a handsome gray freestone found in the vicinity of the city. The U. S. custom-house and post office is a magnificent structure of gray stone. Its length is 361 feet; breadth, 168 feet; and its cost is $5,000,000.

The city extends along the river a distance of 10 miles, its average width being 3 miles, and covers an area of 24 square miles. There are more than 400 acres in public parks, several of the smaller ones being in the thickly populated part. In Burnet Woods there are nearly 170 acres of natural forest. Eden Park, in the eastern part of the city, contains 216 acres, with hills and ravines and a great variety of natural scenery. In this park are two immense reservoirs, with a capacity of [illegible] gallons each, which supply Cincinnati with water. Powerful pumping machinery, with an average daily capacity of [illegible] gallons, raises the water to the reservoirs from the Ohio River. On one of the [illegible] in this park is the Cincinnati [illegible] by an association of ladies. Mr. C. W. W[illegible] afterwards gave $[illegible] for its [illegible] has been [illegible] [illegible]

is to afford an art-education in all the various branches, and it includes departments in art, science, natural history, etc. The present structure is incomplete, occupying only one-tenth of its proposed dimensions. The style is the Florentine-Romanesque. The building lies east and west, fronting south, 354 feet long, 105 feet deep. The central and west wings are now in process of construction. The central entrance-hall is 50 by 60 feet, and the tower is 225 feet high.

Handsome public buildings in the suburbs are the city and county infirmaries, workhouse, house of refuge, and Longview insane asylum. Hamilton county erected the insane asylum, an imposing edifice surrounded by a fine lawn and park and having accommodation for 661 patients. The workhouse is a house of correction for police-court prisoners of adult age who are convicted of minor offences. It has cells for 700, and 26 acres of ground are connected with it. The labor of the prisoners is let out by contract, and their annual earnings amount to $14,854. Grounds and building together cost $650,000. The yearly expenses are $58,878; average number of prisoners, 445. The house of refuge is a place of correction for minors under sixteen. Homeless and destitute children may also be placed there for shelter. Spring Grove Cemetery is a mile beyond the present city limits, and was laid out by Adolph Strauch. It is a park cemetery, the fences between burial-lots being removed and graves levelled nearly even with the ground. It is well shaded by fine trees, and contains nine lakes, frequented by swans and water-fowl. There are 600 acres in the enclosure. It was formerly a body of unsightly swampy ground.

The district known as "Over the Rhine," the portion of the city between the canal and the hill, is inhabited almost wholly by persons of German birth and descent. It is greatly owing to this large proportion of German population that Cincinnati has become noted as a musical centre. Their Saengerfests and singing societies fostered the movement which resulted in the erection of Music Hall and the College of Music of Cincinnati. The first-named building is used for the combined purposes of a music hall and an industrial exposition building, and is the largest and handsomest building of the kind in the United States. It contains an organ, also the largest in the country, whose case was carved by the ladies of Cincinnati. The structure is a noble specimen of architecture, and was planned by S. Hannaford. It has a frontage of 500 feet from N. to S. and 300 feet from E. to W. When the esplanade in front is enclosed a space of 160,000 square feet is afforded for exposition purposes. The Music Hall can accommodate 7000 persons, and its acoustic properties are unrivalled. Dexter Hall is a smaller audience-room in the building, intended for chamber concerts. The entire building, including ground and organ, is valued at $1,000,000. Towards the erection of it Mr. Reuben R. Springer contributed $300,000. The College of Music of Cincinnati, which has also been permanently endowed by Mr. Springer, has a building on the same square on which Music and Exposition Hall is situated. It formerly occupied rooms in the hall, but outgrew its space so rapidly that new quarters were required. Besides this institution there are also admirable private schools for musical culture and many excellent instructors.

[illegible] for the manufacture of tiles and the finer grades of pottery are plentiful in the vicinity of Cincinnati. [illegible] wares made here have [illegible] a high reputation. The Rookwood Pottery,

founded by Mrs. Maria Longworth Nichols, daughter of Joseph Longworth, was designed to advance artistic culture in the branch of ceramics. The establishment is an admirable one, managed wholly by ladies, and its products are sold mostly in New York and Philadelphia. Its decorators were educated chiefly at the Cincinnati School of Design. The Rookwood Pottery wares are unique, somewhat resembling Limoges. They display unusual richness and harmony of coloring. In style of decoration they are peculiarly American, the native flowers, plants, and other objects having been much used in its designs. Carving in clay is also a feature of the ornamentation. A specialty of this establishment is that the color of the body of the ware is utilized as part of the decoration.

With the School of Design, the new School of Technology, the Museum, annual exposition, Rookwood Pottery, Music Hall, and College of Music the future of artistic and industrial education is well provided for in Cincinnati, and all this provision has been made through the munificence of private citizens. A drawback to the city is the coal-smoke arising from her many manufacturing establishments, but with the success of the present movement for smoke-consumption Cincinnati will be in all respects one of the most attractive cities in the Union.

Among its ornamental features is the Tyler Davidson Fountain, a unique bronze structure, 45 feet high, costing nearly $200,000. The bronze-work, consisting of fifteen large figures, was cast at the Munich foundry. The erection of this fountain was a favorite scheme of Mr. Tyler Davidson, and after his death his design was carried out and the work presented to the city by Mr. Henry Probasco.

Cincinnati has 201 churches of all denominations, the principal ones being as follows: Roman Catholic, 51; Methodist Episcopal, 26; Colored Methodist, 5; Methodists of all sects, 37; Presbyterian, 24; Protestant Episcopal, 19; Baptist (9 colored, 9 white), 18; German Evangelical, 15; Jewish synagogues, 7; Disciples of Christ (1 colored, 5 white), 6; Congregational, 5; United Brethren, 3; Lutheran, 2; Friends, 2; Hollandische Reformed, Church of the New Jerusalem, Universalist, Unitarian, 1 each. The Second Presbyterian Church, St. Paul's Methodist Episcopal (both built of blue limestone), the Jewish temple and synagogue, and St. Peter's Cathedral, Roman Catholic, are attractive specimens of church architecture. The spire of the First Presbyterian Church is 270 feet high.

Cincinnati is well provided with schools, public and private. St. Xavier's College, various seminaries, and numerous parochial schools are maintained by the Roman Catholic Church. Mount St. Mary's of the West is a Roman Catholic theological seminary. Lane Theological Seminary is a venerable and highly-prized Presbyterian institution. There is also an excellent law school. The city offers unusual facilities for the education of physicians, containing no less than six medical colleges. Three of these belong to the regular medical school, one is homœopathic, and one eclectic. The homœopathic and eclectic schools admit both sexes. In 1882 the six schools together graduated 304 physicians. There are a school of pharmacy and a dental college, both open to male and female students, also four schools of bookkeeping.

The public schools (free) are under control of a board of education, at present composed of 37 members, one from each of the 25 wards of the city and 12 at large. The superintendent of schools receives a salary of $3500. The city school fund amounted in 1883 to nearly $830,000. There are 40 school-buildings and 707 teachers—females 575, males 132. The German language and music and drawing are part of the course of study. In 1882 there were 85,402 children between six and twenty-one years of age. Of these 1976 were colored. Of the white children there were 2501 more females than males. For the school year ending in 1883 there were 34,388 pupils enrolled—males 17,608, females 15,778. About three-fourths of the colored children attend the separate public schools provided for them. Attending church schools—males 7273, females 7143; private schools—males 482, females 606; public night-schools—males 2589, females 468. Total attending other than day public schools, 15,504. Though Ohio has a compulsory educational law, yet more than one-third of the persons between six and twenty-one years of age are not in any school. There are three public high schools in Cincinnati—the Hughes and the Woodward for white pupils, and the Gaines for colored; also an admirable public normal school. Cincinnati University also belongs to the department of public instruction, tuition being free to residents. It includes six undergraduate courses of study and admits both sexes. Charles McMicken, a wealthy citizen, left a fund in 1858 to establish the university, and this fund has been increased by donations from other benevolent individuals and from the city of Cincinnati. An astronomical department and observatory belong to the university. The observatory is at Mt. Lookout, near the city, and contains a Mitchell refractor of 28 centimetres aperture. The course of astronomical study extends over four years, after which the pupil passing satisfactory examination receives the degree of bachelor of science. The School of Design is a branch of the university. In 1883 this school had 274 pupils. The wood-carving department, established by Mr. Benn Pitman, is of especial excellence. The Ohio Mechanics' Institute, established in 1828 for the diffusion of useful knowledge, is in flourishing condition.

Cincinnati has 13 public libraries, the largest being the Free Public Library, under control of the board of education. It is maintained by bequest funds and by taxation, and possesses 137,972 volumes and 15,565 pamphlets. Connected with it are two handsome and commodious reading-rooms, which are amply supplied with periodicals, both American and foreign, in English and other languages. The Public Library has two branches, one in the Cumminsville, the other in the Columbia, division of the city. The Young Men's Mercantile Library is a useful and admirably managed institution, sustained by membership fees, donations, and bequests. It contains 43,667 volumes, has two reading-rooms, and a well-selected assortment of magazines and newspapers. A valuable law library was destroyed with the county court-house during the riots of 1884.

The Cincinnati Hospital, which is maintained by taxation, accommodates 700 patients. It consists of eight buildings grouped around a court and connected by corridors. It covers 4½ acres and cost over $1,000,000. Gas for the cooking and illuminating purposes of the establishment is made in the building. Destitute city patients are sent here, and there are also excellent accommodations for pay patients. Other hospitals are the Good Samaritan and St. Mary's, both under the management of Roman Catholic Sisters, the Jewish, and the Ohio Hospital (homœopathic) for women and children. All receive both pay and charity

patients. The Sanitarium, on College Hill in the suburbs, is a well kept private asylum for the treatment of nervous invalids and insane patients.

Other charitable institutions are numerous, maintained by bequests and by voluntary contributions. The Children's Home is a handsome building, with rooms for 150. Homeless, destitute, and mistreated children are received here and cared for in the best manner till adopted by suitable persons. A Kindergarten is connected with the home. The Women's and Young Men's Christian Associations are large and influential organizations, maintaining employment agencies, etc. There are five orphan asylums—one general, one colored, two Roman Catholic, and one German Protestant. The Home of the Friendless is a shelter and reformatory for women. The Widows' and Old Men's Home is a fine, substantial building on Walnut Hills. The Relief Union is a charitable organization for the aid of out-door poor. The Board of Associated Charities is a voluntary benevolent union for furnishing work, food, and clothing to worthy destitute persons. The Bethel, on the river-front, is maintained by Mr. David Sinton and other citizens. Large numbers of destitute and homeless persons are temporarily fed and sheltered here. Connected with it are a church and a Sunday-school for children of the poor, which has an attendance of 3000 and attracts many visitors.

The number of periodical publications of all kinds issued here is 133: daily newspapers, 14; weeklies, 46; semi-weekly, 1; tri-weekly, 1; monthlies, 47; semi-monthlies, 11; quarterlies, 10; semi-annuals, 2; annual, 1. The principal hotels are the Gibson House, accommodating 800; Burnett, Emery, Palace, Grand, and St. James. The principal places of amusement are the Grand Opera-house and Robinson's Theatre, each holding an audience of 1800 to 2000 people; Heuck's and the Coliseum. The principal clubs are the Lincoln and Duckworth, political; Cuvier, for the protection of fish and game interests; Elm Street (German), Queen City, Allemania, Phœnix, Railway, the Commercial, and the Musical. For scientific and literary purposes there are the Ohio Philosophical and Historical Society, Natural History Society, and the Literary Club. The Society for the Prevention of Cruelty to Children and Animals is an influential incorporated organization. The Chamber of Commerce, for the advancement of mercantile interests, has 2000 members, its admission fee (since Jan. 1, 1884) being $1000. The Board of Trade, for industrial and manufacturing pursuits, has 500 members, and there is also a produce exchange. Besides these, each important branch of industry has its own organization. Cincinnati is a port of entry. During the year 1883 the direct imports were valued at $1,822,424, and the importations through other ports $218,951.

The U. S. district and circuit courts for the southern district of Ohio are held in Cincinnati. The other courts are the superior, with 3 judges; district court; common pleas, 7 judges; probate, 1 judge; police court, 1 judge; and 10 magistrates' courts. The county court-house is 175 feet high, and with the jail occupies a square of ground. The municipal government is in the hands of a mayor with a veto power, two boards, 25 aldermen, 50 councilmen, who together constitute the common council, and a board of public works. The mayor is elected for two years; salary, $4000. The board of public works has charge of the streets and public works. For municipal purposes the city is divided into 25 wards. The police department, which is directly under control of the mayor, consists of 1 superintendent and 351 men, including patrolmen, sergeants, lieutenants, and detectives. There are 20 mounted or harbor police. Ordinary patrolmen are paid $800 a year, detectives and lieutenants $900. The telegraph and telephone systems are in use. For militia purposes one regiment of National Guards, the First Ohio, has its headquarters here. The fire department is managed by a board of fire commissioners. There are 20 steam-fire companies, 21 steam-engines, 1 chemical engine, 1 reel company, and 5 hook-and-ladder companies. The electric signalling system prevails. Only seven to fourteen seconds are required to hitch the horses to the engine carriages.

The public landing, wharves, docks, etc. extend along the river-front a distance of 2 miles. Cincinnati has direct river communication from the head of the Ohio at Pittsburg to New Orleans, a distance of 2100 miles. This includes also river communication with all the intervening navigable tributaries of the Ohio and Mississippi, thus forming the largest river-system in North America. Since the opening of the canal around the falls of the Ohio in 1872, admitting the passage of boats 300 feet long and 80 feet wide, the large Mississippi River steamers ascend to Cincinnati. The river-trade is of great importance. Immense quantities of coal are annually shipped down the Ohio from Pittsburg and other places. Cincinnati alone consumes, for manufacturing and other purposes, nearly 1,000,000 bushels of coal per week. The steam-vessels plying between Cincinnati and other ports during 1883 numbered 217; tonnage, 75,344. Freight is conveyed up and down the river by means of powerful towboats, to which fleets of barges are attached. Steamers of 1500 tons capacity come up the river to Cincinnati. Value of leading imports into Cincinnati by all modes of transportation for the year ending Aug. 31, 1883, $284,239,878; value of exports for same period, $294,719,798. Of this, about one-fourth was moved by river, the rest by railway and canal.

At extreme low-water mark there are 2½ feet of water in the river channel at Cincinnati; high-water mark is 55 feet above this. In the flood of 1832 the water rose to a height of 65 feet and inundated nearly the whole city, which was then confined to the low grounds. In December, 1847, the river reached nearly 64 feet; on Feb. 15, 1883, it reached 67 feet, and again on Feb. 14, 1884, it rose above 71 feet. By these floods the gas and water works were submerged, and much suffering ensued to the residents. Cincinnati is connected with the opposite side of the river by three bridges and three ferries. The principal passage-way is the wire suspension bridge between Cincinnati and Covington, 2252 feet long and 103 feet above low-water mark. (See BRIDGES.) The second bridge is between Cincinnati and Newport, a mile up the river from the suspension bridge. It is of wrought iron, supported upon stone piers, and is both a railway and wagon bridge. Street-car tracks cross both bridges. The Cincinnati Southern Railway bridge, exclusively for the crossing of railway trains, was built in 1877. It has a span which opens for the passage of steamboats in high water. (See BRIDGES.)

The building of the Cincinnati Southern Railway at an original cost of $18,000,000, increased by the accumulation of interest during construction to $26,000,000, gave new importance to Cincinnati as a railway center. The road runs south through Kentucky and Tennessee to Chattanooga, a distance of 336

communication between the Northern and Southern railway systems. It was leased by the Erlanger syndicate in 1880 for 20 years. During 1883 this road carried 597,975 passengers and 843,737 tons of freight. Gross earnings for this period, $2,427,568.89. Freight consisted largely of livestock, coal, iron, stone, lumber, bark, flour, whiskey, turpentine, grain, cotton, hemp, tobacco, fruit, salt, provisions, and beer. The other railroads reported, for 1881, $20,446,054.99 aggregate gross earnings. Twelve lines of railway enter Cincinnati, being used by twenty-one companies: Cincinnati, New Orleans, and Texas Pacific; Louisville and Nashville; Cincinnati, Washington, and Baltimore; Pittsburg, Cincinnati, and St. Louis; Ohio and Mississippi; New York, Pennsylvania, and Ohio; Cincinnati, Hamilton, and Dayton; Cincinnati, Hamilton, and Indianapolis; Cincinnati, Richmond, and Chicago; Dayton and Michigan; Cincinnati Northern (narrow gauge); Indiana, Bloomington, and Western; Cincinnati and Eastern (narrow gauge); Cincinnati, Columbus, Cleveland, and Indianapolis; Grand Rapids and Indiana; Chesapeake and Ohio, controlling Kentucky Central; Cincinnati, Indianapolis, St. Louis, and Chicago ("Big Four"); Toledo, Cincinnati, and St. Louis (narrow gauge); Cincinnati, Georgetown, and Portsmouth (narrow gauge), Cincinnati and Westwood and Cincinnati and College Hill. The last two are local narrow-guage roads of small importance. The other roads connect with all the railroad systems of the United States, most of which have offices in Cincinnati, and 310 freight and passenger trains arrive and depart daily at six stations. The Cincinnati branch (P., C., and St. L.) of the Pennsylvania Railroad Co. has a large passenger-station at the corner of Pearl and Butler Streets. It is a handsome and imposing building, and adds much to the appearance of that portion of the city. The Union Dépôt, in the central part of the city, admits six trains at one time. The Grand Central Station is also a splendid structure, and is used by five great lines of railway. The first railway leading to Cincinnati was the Little Miami, built in 1840.

The city is connected with Lake Erie by the Miami and Erie Canal, terminating at Toledo on Lake Erie. This water-way joins the Wabash and Erie Canal, the longest canal in the United States (467 miles). Comparatively a small amount of traffic is carried on by canal. Three telegraphic companies—the Western Union, the Mutual Union, and the Baltimore and Ohio Railway Telegraphic Co.—connect Cincinnati with all parts of the civilised world. Thirty-three insurance companies have offices here—fire 26, life and accident 7. There are three lines of street railway; the principal one, owned by the Cincinnati Street Railway Co., has in use 175 cars, 1593 mules and horses, and operates 65 miles of track. The par value of its capital stock and bonded indebtedness is $4,773,900. Two other companies own and operate some 14 miles of track.

There are 13 national banks and 11 private banks. The combined capital of the national banks in 1883 amounted to $9,100,000; that of the private banks to $1,221,000. The clearing-house exchanges for 1883 were $494,414,900. A large amount of capital and earnings of the working classes is invested in building and loan associations. These have in a large measure taken the place of saving banks. There are some 200 of them, a majority being in a flourishing condition. st of them are established upon the perpetual basis.

innati is an important commercial and manu- centre. The first district of Ohio, in which Cincinnati is, pays to the U. S. Government more internal revenue than any other district in the country. The amount of internal revenue taxes paid by it in 1881 was $12,674,546.60, those from liquors, tobacco, and beer being $12,496,145.82. In 1883 the total internal revenue collected here was $10,585,734.35. An immense quantity of malt and distilled liquors is manufactured here. Over 15,000,000 proof gallons of distilled spirits are manufactured, and about 25,000,000 gallons bought and sold annually, with an approximate value of $29,000,000. Nearly 26,000,000 gallons of malt liquors are produced yearly, having a value of $6,500,000. There are 27 malt-liquor breweries. A single one of the large breweries sometimes purchases stamps for 48,000 kegs of beer in a month. The tobacco interest represents one of the most important industries. The city is situated within the limits of an extensive tobacco-growing region. In round numbers, 100,000 hogheads and 20,000 cases and bales of leaf tobacco arrive at this market yearly; 415 establishments are engaged in the tobacco manufacture, employing 3982 persons. The cash capital invested is $1,832,700; the annual value of product exceeds $4,500,000, and in some years has exceeded $5,000,000.

The annual value of industrial products of Cincinnati, with the capital employed and real estate occupied, amounts to $316,000,000. In the branch of pork-packing, Cincinnati, which long stood first, is now second in the United States. There were 173 pork-packing establishments in 1882, employing 1950 persons. The number of hogs packed annually varies considerably, but during the winter season of 1882–83 it was 425,400, the value of product being $15,000,000. During the four months beginning Nov. 1st, in favorable seasons, the average number of hogs slaughtered weekly is 38,000. Summer packing is carried on to some extent. The grain-trade is increasing; its value amounted in 1881 to $10,420,630. More than 500,000 barrels of flour are manufactured annually, while upwards of 1,100,000 are received by shipments. In livestock the annual transactions range from $20,000,000 to $25,500,000. Connected with the railway-tracks are the extensive United Railway Stockyards, covering 60 acres of ground and having a capital of $1,250,000. The trade in livestock at Cincinnati is largely in hogs, but there are also extensive transactions in beef-cattle, sheep, horses, and mules, as the city is connected by two railroads with the adjacent Blue-grass region of Kentucky, famous for stock-raising. The sales of horses and mules in 1883 amounted to 26,975. The grocery trade in 1883 aggregated $19,000,000. In 1883, $7,792,363 worth of furniture was manufactured, largely for the South. This industry employed 3364 persons. The city possesses peculiar advantages for this interest, being in the heart of a region which produces the best quality of both hard and soft woods. The manufacture of burial-cases is carried on more extensively here than in any other city in the Union. Besides reaching every part of this country, Cincinnati burial-cases and hearses are sent abroad to Egypt, Turkey, and other foreign lands. In 1881, $1,329,200 worth of coffins and burial-cases were made, requiring the labor of 852 persons. In the manufacture of carriages, light wagons, and wheeled-vehicle materials Cincinnati is noted. This industry is steadily growing. Its products for 1883 amounted to $9,935,112, occupying 4120 hands. Thirteen factories are engaged in the manufacture of white lead and paints. More glycerine is made in Cincinnati than in any other city in the world.

Building materials of all kinds, stone, earth, and wood, of the best quality, abound in the vicinity of Cincinnati. Fine varieties of marble are brought from the quarries of Tennessee, South Carolina, and Georgia. Numbers of brickyards are in operation in the city limits. Some have been operated in the winter by means of artificial heat. During 1881, 60,000,000 bricks were made in the yards maintained by Cincinnati capital, all for local use. A variety of red pressed brick and ornamental tile-work gives a very attractive appearance to the newer buildings of the city.

An inexhaustible supply of bituminous coal for manufacturing purposes is easily obtainable. Besides the river-supply, coal is shipped by rail from mines in Ohio, Indiana, and Kentucky. The Southern Railway brings the city within easy reach of coal- and iron-mines now being opened. The receipts of coal of all kinds in 1883 were 2,025,859 tons. The annual value of the iron production is estimated at $10,900,000. There are 43 mills, foundries, and other establishments engaged, employing 3500 hands. In the manufacture of machinery for 1881 the value of the product was $3,913,813, occupying 1508 persons. The receipts of cotton for 1882 were the largest ever known—402,599 bales; the shipments were 396,783 bales. In 1883 the receipts were 383,131 bales; the shipments, 376,912 bales.

The net debt of Cincinnati is $23,907,474, chiefly on account of the Cincinnati Southern Railway, which the city built and owns. Value of real and personal property in 1884, according to tax-duplicate, $166,925,286; rate of tax-levy, $2.05 on $100.

The site of Cincinnati was occupied by an Indian town before the white man came. Important and interesting relics of the pre-historic Mound-builders have also been found here. In 1780 two block-houses were built upon the ground as a defence against Indians. In 1788 a permanent settlement was made. The town was first called Losantiville, a name said to mean "the town opposite the mouth of the Licking River." It afterwards received from Gen. Arthur St. Clair its present name, in honor of the Society of the Cincinnati, which had been recently formed. It was incorporated as a city in 1814. In 1816 the first steamboat was built in Cincinnati; in 1830, for the promotion of trade, the Miami Canal was constructed; in 1840 the first railroad was built. By thus steadily adopting improved facilities for commercial intercourse the city attained such marked prosperity that it became known as the "Queen City of the West." Even the outbreak of the Civil War hardly checked the steady growth of Cincinnati's commerce. In September, 1862, the city was menaced with attack by a Confederate force, but this was happily averted. In the closing years of the war trade received a remarkable stimulus, and since that time much has been done to improve intercourse with the Southern States, the beneficial effects of which are now manifest. Manufactures also have steadily advanced in number and importance. As the wealth of the city has increased great attention has been given to the cultivation of the fine arts, as has already been shown. This progress, however, has not been unattended by drawbacks. Lax administration of justice enabled criminals to escape the penalties of their crimes. At last, in March, 1884, a prisoner charged with an atrocious murder was convicted of manslaughter and sentenced to imprisonment. Great disapproval of the verdict was manifested throughout the community. A mob assaulted and broke into the jail March 28, but the criminal whom they wished to seize and execute had already been removed. The State militia were called out to suppress the riot, and in the conflicts which ensued 45 persons were killed and 138 wounded, and the courthouse and other buildings were burnt. After three days of terror order was restored. Since that time the tone of public morality has greatly improved. (E. A. C.)

CINCINNATI, Society of the, was instituted in 1783 by the regular officers of the Continental army at their cantonments on the Hudson River. The Continental Congress had on April 11, 1783, proclaimed a cessation of hostilities against Great Britain, and the officers of the army saw that in a few months they would have to separate, perhaps never to be reunited. Many of them already had been obliged to sacrifice their estates for the support of themselves and their families, as Congress had been unable to pay them even in a depreciated currency, and they would have nothing to take with them to their several homes but the recollection of their services. Meetings were therefore called by Baron Steuben, Major-Gen. Henry Knox, and Brig.-Gen. Jedediah Huntington on May 10 and 13 and June 19, at which the society was instituted to perpetuate the remembrance of the independence of the American States and the mutual friendships which had been formed amid common dangers. The society was to consist of the officers of the American army and their eldest male posterity, and in failure thereof the collateral branches who should be judged worthy. It was named from Lucius Quintius Cincinnatus, whose example the officers proposed to follow in returning to the condition of private citizens. Its objects, as set forth in the "Institution," were to preserve the rights and liberties for which its members had fought and bled; to promote union between the respective States; to render permanent the affection subsisting among the officers. The general society was divided into State societies, each of which should have its own officers and meet always on the anniversary of the Declaration of Independence. The general society consisted of certain general officers and a representation from each State, not exceeding five, and was to meet at least triennially. All the commissioned officers who had served at any time in the American army were declared eligible to membership, and also the eldest male branches of officers who had died in the service. Each State society was authorized to pass on the qualifications of applicants for membership, and might take as honorary members for their own lives only men eminent for their abilities and patriotism, but the ratio of honorary members to other members should not exceed one to four. Officers of the French army above the rank of lieutenant-colonel who had served in the United States, and officers of the French navy who had commanded on the American coast, were also made eligible.

The original general officers of the society were Gen. George Washington, president; Major-Gen. Horatio Gates, vice-president; Major-Gen. Henry Knox, secretary, Brig.-Gen. Otho H. Williams, assistant secretary; Major-Gen. Alexander McDougall, treasurer. The successors of Gen. Washington in the presidency of the society have been Alexander Hamilton, elected in 1800; Charles Cotesworth Pinckney, 1805; Thomas Pinckney, 1825; Aaron Ogden, 1829; Morgan Lewis, 1839; William Popham, 1844; Henry A. S. Dearborn, 1848; Hamilton Fish, 1854. In each State society the first president was as follows: New Hampshire, Major-Gen. John Sullivan; Massachusetts, Major-Gen. Benjamin Lincoln; Rhode Island, Major-Gen. Nathanael Greene; Connecticut, Brt. Major-Gen. Jedediah Hun-

tington; New York, Major-Gen. Alexander McDougall; New Jersey, Brig.-Gen. Elias Dayton; Pennsylvania, Major-Gen. Arthur St. Clair; Delaware, Surgeon James Tilton, M. D.; Maryland, Major-Gen. William Smallwood; Virginia, Major-Gen. Horatio Gates; North Carolina, Brig.-Gen. Jethro Sumner; South Carolina, Major-Gen. William Moultrie; Georgia, Bvt. Major-Gen. Lachlan McIntosh; France, Lieut.-Gen. Count de Rochambeau.

The State society of the order in France was organized under the most favorable circumstances. King Louis XVI., having received a copy of the "Institution," permitted French subjects who were eligible to become members, and after passing the examination their names were sent to him for confirmation. As the superior French officers who had served in America belonged to the higher French nobility, the order of the Cincinnati, by reason of its honorable character and the limitation on possible membership, became greatly prized and eagerly sought for. But the Revolution of 1792 so dispersed its members that no more meetings were held.

In the United States considerable opposition was manifested for a time, and it was feared by some that the members would use their association as a means of political advancement. Its only political object, however, was to obtain a stronger national Government than the inefficient Confederation of 1781, and after contributing largely to the adoption of the Constitution of 1787 its political mission was ended. Some of the State societies have become extinct, and persons who are entitled to claim membership in those States are allowed to prefer their claims in one of the existing societies. The following are the presidents of the State societies now existing: Massachusetts, Samuel C. Cobb; Rhode Island, Nathaniel Greene, M. D.; New York, Hamilton Fish; New Jersey, L. Q. C. Elmer; Pennsylvania, George W. Harris; Maryland, William S. Williams; South Carolina, Wilmot G. De Saussure.

The badge of the society consists of an enamelled gold bald eagle, bearing on its breast a blue enamelled medal with prescribed devices. The ribbon is deep-blue, watered, two inches wide, edged with white. The insignia of the order, set in diamonds, and presented by Count D'Estaing on behalf of the naval officers of France to Gen. Washington, has descended to each successive president of the society.

No other association in the United States has numbered so many of the most eminent citizens among its members. While the limitation put upon membership may have unduly circumscribed its usefulness, the society continues as a repository of the traditions and principles of the Revolutionary fathers and one of the most honorable organizations of a national character.

(A. B. G.)

CINNABAR. See CALIFORNIA.

CIRCASSIA. In many English and American works—the ENCYCLOPÆDIA BRITANNICA not excepted—a remarkable confusion exists with reference to the people which, under the leadership of Schamyl, offered a long and spirited resistance to the conquest of the Caucasian range by the Russians. The people of the Western Caucasus—called by themselves Adighe, by the Russians Tscherkesse, and in Western Europe Circassians—are Moslems of the Sunni sect. Formerly they were Christians. As late as the seventeenth century the Genoese found Christian churches among them. And, while Moslems by profession, they were so ignorant of their own religion that it was found necessary to teach them the daily prayers after their wholesale emigration to Turkey in 1864. That emigration was not preceded by any extensive or spirited resistance to Russian authority. The fate of the resistants in the Eastern Caucasus seems to have satisfied them that a struggle would be hopeless, and they sought a home by emigration in preference to either defending their country or submitting to an alien rule. The atrocities they committed afterward in Bulgaria are not relieved by any background of heroism in their early history.

See Vol. V. p. 668 Am. ed. (p. 787 Edin. ed.).

The principal districts in the Eastern Caucasus are Lesghestan and Daghestan. The people of both are Moslems of the Shiah sect, like the Persians and the natives of Oude in India. Early in this century the country witnessed a great awakening of religious zeal under a series of spiritual and military leaders, of whom Schamyl (Samuel) was the last and the bravest. The occupation of the coast of Daghestan by Russia as a necessary consequence of her annexation of the Christian kingdom of Georgia (or Gerusien) in 1800, intensified, if it did not cause, this Murid movement. For over half a century the Lesghians resisted Russian advances, and not until their country had been pierced by great military roads did their last army under Schamyl surrender, in 1859. Of the glory of this resistance they have been robbed by a blunder which transfers it to a race alien from them in faith, in blood, and in character.

CIRCLEVILLE, the county-seat of Pickaway co., Ohio, is on the Scioto River, 24 miles S. of Columbus, on the Scioto Valley Railroad, the Cincinnati and Muskingum Valley Railroad, and the Ohio Canal, which here crosses the Scioto by an aqueduct. A coal railroad to the Hocking coal-fields, 30 miles S. E., is now in process of construction. The city is well laid out, with wide, shady streets and handsome residences. It has a good court-house, fine Masonic temple, two hotels, two national banks, three weekly newspapers, thirteen churches, and three public-school buildings, and there are two large pork-packing establishments, a tannery, machine-works, a flour-mill, two planing-mills, and vegetable-canning works. The city has two steam fire-engines, gas, and a telephone exchange. Its property is valued at $3,300,000; its total tax is $66,000, and it is free of debt. It was laid out in 1810, and incorporated as a city in 1830. The town derives its name from the celebrated circular earthworks erected here centuries ago by the Mound-builders. Population, 6046.

CIRCUIT PREACHERS. See METHODISTS.

CIRCULATION. The term circulation, in biology, refers to that function by means of which the nutritive materials supplied by absorption are distributed to the economy after being subjected to aëration, and by which the refuse and effete materials are carried where they may be excreted. Circulation is an organic function, being present in both the animal and the vegetable kingdom. In the simplest forms of life, both animal and vegetable, in which absorption takes place by imbibition from the entire external surface, no special circulatory apparatus is required; it is only when certain tissues become specialized organs for absorption, and others for aëration, that a necessity arises for some apparatus by which the materials absorbed are conveyed from the point of absorption to the respiratory organs and to the system at large. The development of the circulatory apparatus is therefore proportional to the degree in which absorption and respiration are limited to special tissues.

Circulation in Plants.—In the lowest forms of plants, such as the *Algæ*, which absorb by their whole surface, there is no provision for carrying on a circulation of fluid. In the *lichens*, in which absorption appears to be restricted to the sides least exposed to light, there first appears the capability—probably by imbibition, as no signs of tubular structure can be detected—of transmitting fluid absorbed at certain points throughout the entire plant. In the higher *Fungi*, as in the mushrooms, the nutritive matter which is absorbed by the mycelium at the base is transmitted through the elongated cells, and possibly also by the intercellular spaces, to the summit, where it is diffused in all directions. In this group is seen the first indication of what has been developed into the vascular system in the higher forms; for, while in species in which the transmission of fluid takes place in all directions the cells retain a rounded form, as soon as there appear the first signs of limitation of the absorbing surface the cells become elongated and arranged end to end, and the fluids are transmitted through these cells in the direction of their long axes. In the higher *Cryptogamia*, as the mosses and ferns, the signs of a vascular system become much more marked; in them there is a regular transmission of fluid from the roots to the leaves, partly through the cellular structure and partly through the scalariform vessels. As the power of absorption becomes limited to special tissues and a distinct axis of growth is developed, the last-formed cells of the roots—the so-called *spongioles*—before being converted into woody fibre possess the power of absorbing nutritive materials from the ground and of delivering the products of absorption to the cells next above, which transmit them from below upward. In addition to this method of transference, we also find in the *ferns* and *mosses* systems of tubules which, in the active stage of vegetation, are also concerned in the transmission of fluid. In the *Phanerogamia* the fluids are transferred through a perfect system of tubules, and in two directions, the ascending sap consisting mainly of water absorbed by the spongioles, and the descending or elaborated sap after the fluids absorbed have been subjected to aëration and elaboration in the leaves. Even in the higher plants, however, circulation, in the sense of a continuous movement in a circle, is incomplete, as there is a steady upward flow at one time and a steady downward flow at another. In addition to this upward and downward movement, however, cross-currents, due to imbibition and osmosis, can be detected. The propelling forces in the circulation in plants are (1) the *vis a tergo*, resulting from continued absorption in the roots; (2) the *vis a fronte*, by which this fluid is drawn to the parts in which it is employed and to the leaves, where exhalation is continually taking place; and (3) capillarity and osmosis, which serve to maintain a continuous movement.

Circulation in Animals.—As might be expected from the definition of the circulation, in the lowest animals, as in plants, in which absorption takes place from the entire external surface, there exists no apparatus for carrying on a circulation of fluid, the contractile vesicles seen in many of the *Protozoa* having, probably, rather a respiratory than a circulatory function. It is only when the digestive organs become highly specialized that a circulatory apparatus appears. This is in the form of spaces or cavities in close communication with the digestive cavity and with the external surface, the fluid which fills them, in the lowest of higher orders, is moved by the contractions of the entire body and by the vibration of cilia lining the somatic cavity, there being no indication of either a heart or a vascular system. In the *Turbellaria*, *Trematoda*, and *Cestoidea* the lacunæ of the mesoderm and interstitial fluid of its tissues are the representatives of a blood-vascular system—a condition closely analogous to what has been already noted as the first indication of a circulation in plants. In *Annelida*, as is also the case in the *Rotifera*, we find a perivisceral cavity lying between the splanchnopleure and the somatopleure, communicating with the segmental organs, as the water-vascular system. In the former group there is also to be found a system of canals (the *pseud-hæmal* system), in some instances communicating with the perivisceral cavity, with contractile and often ciliated walls, and containing a clear, sometimes corpusculated fluid, which may be either red or green from the presence of a substance which resembles hæmoglobin and which is evidently of a respiratory value. These canals always communicate at some point by a tubular stem with the exterior. In the lowest forms of the *Arthropoda* the same general conditions noted in the *Turbellaria* are to be found—viz. a perivisceral cavity and an interstitial fluid, in which, however, colorless cells may be detected. In the lower *Crustacea* and in many *Insecta* we find a single elongated, sometimes segmented, contractile vessel, the *dorsal vessel*, provided with lateral valvular openings by which the blood enters from an enclosing venous space or sinus. In the higher *Crustacea*, as in the lobster, there is a single, well-developed, muscular, systemic *dorsal* heart, surrounded by a venous sinus and giving off a number of arteries, which pass into capillaries; but the venous system still remains more or less lacunar. In the *Mollusca*, also, the same gradual differentiation of the blood-vascular system is observable. In some of the lowest forms, as in *Polyzoa*, neither a contractile heart nor even vessels can be detected, circulation in them, as in lower forms, being carried on by mere imbibition. In the *Tunicata* the heart, whose position closely resembles its ventral situation in the *Vertebrata*, has no valves between its dilated chambers, and the blood is propelled by opposite peristaltic movements, first in one direction and then in another; hence, here the heart is sometimes systemic and sometimes respiratory. The most perfect form of circulation found in the *Mollusca* exists in the *Cephalopoda*. In them there is a systemic ventricle provided with valves at its orifice, with systemic arteries, the blood being returned into a large venous sinus, from which it passes to the gills through contractile vesicles, the branchial hearts, which serve to propel the blood through the gills; from there it passes again into contractile venous sinuses, which, therefore, act as auricles, and is then driven to the heart.

Thus we find that in the *Invertebrata* the circulatory apparatus, even in the highest forms, contrasted with what we shall find in the Vertebrata, does not consist of a continuous series of tubes, but that the blood passes from such vessels into spaces (*lacunæ* or *perivisceral* spaces without distinct walls. Connected with the vessels we often find several pulsating cavities more analogous to the lymphatic or venous hearts found in the Vertebrata than to a true respiratory or systemic heart. When a heart is present in the invertebrates, it is, as a rule, placed on the dorsal aspect of the body, contrasted with its ventral position in vertebrates, and serves systemic and not respiratory function. In the invertebrates there is no trace of a portal system, the liver being supplied by the systemic arteries.

In the *Vertebrata*, *Amphioxus*, the lowest form of fish, has a system of blood-vessels with contractile walls, but no distinct heart, while in all the other vertebrates there is a heart with at fewest three chambers (*sinus venosus*, *atrium*, *ventricle*), arteries, capillaries, and veins, and a system of lymphatics connected with the veins. In many of the lower forms of vertebrates we still find large venous sinuses, but in the higher forms these are for the most part replaced by definite vessels with muscular walls. Important peculiarities, however, exist in the vascular systems of the Vertebrata dependent upon the character of their respiration, whether *pulmonated*, or air-breathing, or *branchiated*, or water-breathing; and further, as to whether their blood is warm or cold. *Mammalia* and *birds* are included in the group of warm-blooded pulmonated Vertebrata; *Reptilia* and *Amphibia* in the group of cold-blooded pulmonated animals; and fish constitute the group of cold-blooded branchiated Vertebrata. In all of these animals the character of the circulatory apparatus depends upon the manner in which the blood is oxygenated; therefore, in those animals, as some of the Amphibia, which commence life as branchiated animals and subsequently become pulmonated, we find that their circulatory apparatus becomes modified accordingly, and presents two different styles corresponding to the stage of their existence. In all forms of Vertebrata a portal system is present—that is, the liver receives a special supply of venous blood derived from the systemic capillaries of the abdominal organs.

In *Fishes*, the lowest forms of vertebrates, the heart consists of a single auricle with the sinus venosus, which is always present, and a single ventricle, the former receiving the dark venous blood from the body and transmitting it through an opening, guarded by a valve, to the ventricle, from which the blood is propelled to the *bulbus arteriosus*, and then through four or five branching vessels supported on the cartilaginous branchial arches to the gills. After being subjected to aëration in the capillaries of the gills, the blood is then collected by the branchial veins, which, uniting into a single arterial trunk situated on the dorsal aspect of the alimentary canal, and corresponding to the aorta of higher vertebrates, serves by a system of branching vessels to distribute the arterial blood to the system at large; whence it is again returned by the venous system, after passing through the systemic capillaries, to the auricle. In fishes, therefore, the respiratory apparatus forms a part of the general systemic circulation, the heart being, therefore, a branchial and not a systemic organ, and the circulation being *simple* instead of *imperfectly double*, as in the Reptilia, or *perfectly double*, as in the warm-blooded Vertebrata. In the fish, as in all vertebrates, a portal system, composed of veins from the digestive apparatus, conducts the blood from the abdominal organs through the kidneys and liver; hence, in the fish both these glands receive venous blood.

In the *Reptilia* the heart consists of two auricles and one ventricle. The right auricle receives venous blood from the system at large; the left auricle receives arterial blood from the lungs; both discharge their contents into the single ventricle, which thus receives a mixture of venous and arterial blood. From the ventricle the blood is driven partly through the lungs and partly to the general system, so both lungs and system receive a partially aërated blood, forming an incomplete double circulation. In the Reptilia, as a rule, there is a distinct arterial and distinct pulmonary trunk arising from the ventricle, but in the Amphibia there is only a single trunk, of which the pulmonary arteries are branches, rising from the ventricle. In the crocodile there exists a partial ventricular septum, so placed that it serves to direct the dark venous blood entering from the right auricle chiefly into the pulmonary arteries, whilst the arterial blood coming from the left auricle is sent out into the systemic arteries, thus closely approaching the double circulation of birds and mammals. A portal circulation is also present in the cold-blooded pulmonated Vertebrata, and, as in the fishes, is connected with the renal veins.

In *Birds* the heart, as in man, consists of four cavities, two auricles, and two ventricles, and the general distribution of the circulation is the same—*i. e.*, the right auricle collects the blood from the systemic veins, transmits it to the right ventricle, which by means of the pulmonary artery forces the blood through the lungs. From the lungs the oxygenated blood is carried by the pulmonary veins to the left auricle, from there to the left ventricle, and thence, by means of the aorta and its branches, to the system at large. There is therefore in birds a perfect *double circulation*—a pulmonary and a systemic circulation. The portal system is also present in birds, and, as in the lower vertebrates, receives branches from the kidneys and from the lower limbs.

The circulation in *Mammals*, of which man may be taken as a type, deserves to be treated at somewhat greater length than the circulation in inferior organisms. As in other vertebrates, with the exception of the openings of the larger lymphatics, the blood is contained in a completely closed system of vessels, whose course and general arrangement we will first trace in general outline. The circulation is carried on through a system of tubes of different functions and different properties. These are (1) the central organ, the heart, a hollow muscle which serves as both a pump and a reservoir, divided into four cavities, two auricles or receivers of blood, and two ventricles or pumps; (2) the arteries, a system of muscular and elastic tubes coming off from the heart, and which gradually subdivide, like the trunk of a tree, into branches, and which serve to carry oxygenated blood to the tissues; (3) the veins, another system of branching tubes, also elastic and muscular, but less so than the arteries, which conduct to the heart the blood collected from (4) the capillaries, a system of fine tubes situated between the arteries and the veins.

In *Man*, as in other mammals, we have to deal with a double circulation—the systemic circulation, and the pulmonic. Their general outline may be given as follows: Starting from the heart, the arterial blood leaves the left ventricle through the *aorta*, which immediately gives off two vessels, the coronary arteries, for nourishing the tissue of the heart itself; the aorta then divides into branches, which themselves become successively subdivided to supply arterial blood to the head, trunk, limbs, and all the organs of the body, the vessels becoming finally so minute as to allow merely the passage of a single blood-corpuscle, forming then the so-called capillary vessels. From the capillaries the blood is again collected by converging venous radicals, which finally are united to form two main venous trunks—the *vena cava superior*, bringing the blood from the head and upper extremities, and the *vena cava inferior*, collecting the blood from the trunk and lower limbs. Both of these large veins empty into the *right auricle*, completing the circuit of the greater or

systemic circulation. From the *right auricle* the blood is emptied into the *right ventricle*, from which it is forced by the heart's contractions into a single large trunk, the pulmonary artery. This artery, which, however, contains venous blood, soon divides into two trunks, one going to each lung, each of which divides and subdivides in the lung-tissue to form a second capillary network, in which the dark venous blood is subjected to the influence of the air contained in the air-cells, gives up its carbonic acid and certain organic impurities, and absorbs oxygen, becoming again bright, red arterial blood. It is then collected by the pulmonary veins and carried to the left auricle, thus completing the lesser or pulmonary circulation and bringing us back to the point from which we started.

We may now study the phenomena of the circulation more in detail. *The heart*, in man, is placed in the anterior mediastinum, between and partially covered by the two lungs, and contained in a serous sac, the pericardium. Its base is directed upward, backward, and to the right; it extends from about the fourth to the eighth dorsal vertebra, and rests upon the cordiform tendon of the diaphragm. The apex lies between the cartilages of the fifth and sixth ribs, about two inches below the left nipple and an inch to its sternal side. The heart is a hollow muscle containing four cavities—two auricles lying at the base, for the reception of blood, and two ventricles, for its propulsion, after delivery from the auricles. The walls of both ventricles are much thicker than those of the auricles, and the left ventricle is much more powerful than the right. The right auricle and ventricle constitute the respiratory heart; the left auricle and ventricle, the systemic. When the auricles become filled with blood, they suddenly contract and drive the greater part of the blood which they contain into the ventricles, which are at this moment empty and dilating, and thus offer less resistance to the entrance of blood than do the veins which are filled; consequently, the resistance being less in the direction of the ventricles, no valves are required at the openings of the veins to prevent regurgitation. Immediately after the contraction of the auricles, which requires about one-fifth of the time of a cardiac revolution, and the consequent distension of the ventricles with blood, the ventricles contract (the cardiac *systole*), and propel the blood into the large arteries, the pulmonary artery and aorta, reflux into the auricles being prevented by the action of valves situated at the auriculo-ventricular rings. Contrary to what occurs in the auricle, the ventricles contract slowly, but with great force, their time of contraction occupying about three-fifths of the time of complete revolution, during which time they empty themselves completely.

Immediately after the contraction of the ventricle is completed, they commence to relax (the cardiac *diastole*) and slowly to fill with blood from the auricles, regurgitation from the great arteries being prevented by the semilunar valves attached at the openings of these vessels. After a period equal to about one-fifth of the time of an entire revolution, during which the heart is in repose, the auricles again contract, then the ventricles, and so on indefinitely.

We thus see that, like all muscles, the heart is contractile; but, unlike nearly all other muscles, it contains within itself something which causes its different parts to contract in a definite succession and at regular intervals even when removed from the body, constituting what is called the cardiac rhythm. The rate of this rhythm—or, in other words, the mean rate of the *pulse*—is, in adults, about 72 beats per minute; in the fœtus, however, it is much greater (184). After birth the pulse decreases in frequency up to the twenty-first year, while in old age the frequency again appears to increase. The rate of pulsation is affected by various influences; thus, exercise increases the pulse, as does heat, the erect position and digestion, while cold and a horizontal position will tend to reduce its frequency; strong emotions and many drugs may also affect the rate of pulsation. When the ear is applied over the region of the heart, certain sounds are heard which succeed one another with great regularity at intervals corresponding with those of two sounds to every beat. First comes a long, dull sound, then a short, sharp sound, then a pause, then the long sound, the short, and the pause again. The first of these sounds is synchronous with the ventricular systole and the impulse of the heart against the chest-wall, and is produced by the musical note of muscular contraction, together with the sound produced by the closure of the auriculo-ventricular valves and the rush of blood out from the ventricles. The second sound is produced by the sudden closure of the semilunar valve, situated at the openings of the pulmonary artery and aorta.

Circulation in the Arteries.—The arterial system may be regarded as a cone whose apex is at the left ventricle, and whose base is the capillary apparatus; and the venous system, as a cone whose base is also at the capillaries, opposed to the arterial cone, and whose apex is also found in a muscular chamber, the right auricle, so completing the systemic circle. The pulmonic circle may be regarded as constituted in the same way, the apex of the arterial cone being in the right ventricle and the apex of the venous cone in the left auricle, the pulmonary capillaries furnishing a common base-line. By means of this simple conception of the circulatory apparatus, we can account for the pressure and velocity of the blood-currents in different situations. At each contraction of the ventricles the pressure in the arterial cone is increased from the injection into it of a new amount of fluid, and the pressure in the venous cone is reduced at each contraction of the auricle from the abstraction from it of a certain amount of blood; hence, circulation is maintained from the ventricle to the auricle, the velocity (and pressure in the arterial system) of the blood-current at any one point in these cones being inversely as the distance of those points from the apex of the cone. When the contents of the ventricles are suddenly forced into the arteries (which are already full), a shock is given to the whole mass of fluid which they contain. This shock (the pulse) is propagated almost instantaneously throughout the fluid, becoming fainter and fainter in proportion to the increase of its mass in the capillaries, and finally ceases to be discernible. If the blood-vessels were of rigid material, the fluid which the arteries contain would be transported forward as far as this impulse was competent to carry it, at the same instant as the shock, throughout their whole extent; and, as the arteries empty into the capillaries and the capillaries into the veins and these into the heart, there would be returned to the auricles, almost at the same moment that the ventricles contract, a quantity of fluid exactly equal to that driven out of the ventricles, and the current through the blood-vessels, both arteries and veins, would be intermittent. The blood-vessels, however, are not rigid, but are extremely elastic, from their muscular

and elastic fibres; hence, when the ventricles contract, they force an additional amount of blood into a filled system of the tubes, which, from their elasticity, dilate to accommodate it, and the recoil from the over-distended condition during the diastole of the heart serves to maintain onward motion in the blood-current and tends to render it continuous. Thus we find that the large arteries near the heart contain the largest proportion of elastic tissue, and the vessels are here consequently most distensible and the pulse is most marked; but from the very fact that they are so elastic they tend to overcome the intermittent action of the heart, and by the time the capillaries are reached the blood-current is almost continuous. In addition to the elastic tissue, the smaller arteries are richly supplied with muscular tissue, through whose degree of contraction the amount of blood supplied to any part is regulated.

As already mentioned, there are two capillary networks through which the blood must pass—the pulmonic capillary system and the systemic capillary system. The functional difference between these capillary systems depends upon the character of the changes which the blood which they contain undergoes. In the pulmonic capillaries the blood takes up oxygen and gives off carbonic acid; the reverse takes place in the systemic capillaries. Throughout the whole of the passage, therefore, from the pulmonic capillaries to the systemic, the blood is rich in oxygen (*arterial*); during its passage from the systemic to the pulmonic capillaries it is poor in oxygen and rich in carbonic acid (*venous*).

The Influence of the Nervous System on the Circulation—As already stated, the heart possesses the power of maintaining a regular and rhythmical pulsation even when removed from the control of the nervous system; it possesses this power in virtue of its intrinsic nervous ganglia, which, while capable of maintaining the pulsation of the heart, are nevertheless, in a normal state, controlled by the central nervous system. The heart is connected with the cerebro-spinal axis by two systems of nerves, the efferent and the afferent nerves. The efferent fibres, which proceed from the cerebro-spinal axis to the ganglia of the heart, are of two kinds, *inhibitory* and *accelerator*. The *inhibitory nerves* arise in the medulla oblongata, in the cardio-inhibitory centre, and reach the heart through the pneumogastric nerves. These fibres, like the centre from which they arise, are in a constant state of activity, and exert a controlling or inhibitory effect on the heart's pulsations. Thus, when they are stimulated, the pulsations of the heart are reduced in number, and the heart may even be arrested in diastole; when divided or paralyzed, the heart beats faster. They have been well compared to a brake. The *accelerator nerves* also arise in the medulla oblongata, pass down the lateral columns of the spinal cord, and reach the heart through the branches of the cardiac plexus derived from the last cervical and first dorsal sympathetic ganglia. These nerves are not usually in a state of activity, and a result of their intermittent activity is to accelerate the movements of the heart. The ganglia of the heart are also in communication with the medulla through *afferent fibres*, which appear to run mainly in the trunk of the pneumogastric nerves or in their branches. These nerves are of three different kinds: *first*, those of common sensibility; *second*, excito-cardio-inhibitory—*i. e.* nerves whose stimulation leads to an increased activity of the cardio-inhibitory centre in the medulla, and a consequent reflex inhibition of the heart through efferent vagus fibres; *third*, depressor fibres, which, when stimulated, lead to an inhibition of the vaso-motor centre in the medulla oblongata, and a consequent dilatation of the systemic blood-vessels.

In the blood-vessels are to be found two antagonistic tissues, the elastic tissues, tending to produce dilatation of the vessels, and the circular muscular fibres, which tend constantly to reduce the calibre of the vessels. The normal condition of partial contraction of the blood-vessels is due to a constant series of nerve-impulses originating in the vaso-motor centre in the floor of the fourth ventricle of the brain, and reaching the vessels through branches of the sympathetic system of nerves, the vaso-constrictors, and to the presence of local peripheral vaso-motor ganglia on the walls of the vessels. In addition to these nerves, the blood-vessels are also supplied with branches, mainly of the cerebro-spinal nerves, which are not in constant activity, but which, when called into activity, serve to inhibit the peripheral ganglia, to prevent contraction of the muscular coat of the arteries, and allow expansion to take place through the tendency of the elastic tissue to regain its position of equilibrium. (R. M. S.)

CIRCUS.—This name is applied indifferently to the building or enclosure within which is contained a circular space or "ring" designed for the exhibition of feats of horsemanship, gymnastics, etc., and to the company of performers. Though the circus in its present form can claim an antiquity of little more than a century, it can easily be linked with the Roman arena. Ruins of the amphitheatres built during the Roman occupation of Britain still remain at various places, and an illumination of an Anglo-Saxon manuscript in the Harleian Collection shows an audience in such an amphitheatre diverted by a musician to whose music a man is dancing, while another performer exhibits a tame bear which feigns to be asleep or dead. In later periods we find anticipations of the modern circus in the exhibitors of dancing bears and of horses that beat the kettle-drum with their fore feet, and the gleemen, some of whom were tumblers and jugglers. One illuminated manuscript shows a juggler throwing three balls and three knives alternately; another represents a boy leaping through a hoop; a third, a female acrobat bending backward; while in others are seen dancing bears and apes, an ox balancing itself upon a horse's back, a horse on the tight-rope, another walking on its hind legs and engaged in mimic warfare with a man armed with sword and buckler, etc. Reginald Scot mentions among the tricks of the jugglers who frequented the fairs during the reign of Elizabeth "the decollation of St. John the Baptist," which is "the severed head" of modern conjurors; and the literature of the period abounds in allusions to similar shows. Banks and his famous performing horse Morocco, which danced and solved arithmetical questions, must have been known to Shakespeare ("The dancing horse will tell you," *Love's Labor Lost*, i. 2); that natural curiosities were then exhibited is proved by Trinculo's speech on the discovery of Caliban, and Jonson in *The Alchymist* testifies to the early use of the circus-poster. The shows, which had grown into favor despite their temporary discouragement by the severe Vagrancy Act of Elizabeth, suffered an eclipse during the Puritan ascendency, but soon became once more the favorite attractions at the fairs. Puppets and "motions" are mentioned in 1641, though the earliest specific notice of Punch in London seems to be that found in the overseers' books of St. Martin-in-the-

Fields, 1666–67. Evelyn in 1654 records that he saw a "tame lion play familiarly with a lamb," a six-legged sheep, and a four-legged goose; and in 1657 speaks of a famous rope-dancer who went through such feats as had been performed by a Spaniard in the presence of Edward VI., and of a hairy or bearded woman. Jacob Hall, the first lover of Nell Gwynne, was a noted acrobat and rope-dancer of the time, and threw his somersaults over naked rapiers and men's heads; Joseph Clark, the posturer, one of the wonders of London during the reigns of James II. and William III., seems to have been the original "boneless man;" and William Stokes, a famous vaulter, in the illustrations in his book published at Oxford in 1652 shows himself vaulting over horses and leaping upon them, in one case alighting on the horse's back, in one in the saddle—a feat re-introduced in modern times as a novelty. He seems to have been the first to introduce horses in the performance. Giants, dwarfs, monsters, and wild men had always been popular. The first menagerie seems to have appeared at Bartholomew Fair in 1708, in the "Collection of Strange and Wonderful Creatures" being included the Noble Casheware, a leopard from Lebanon, an eagle from Russia, a "possoun" (opossum?) from Hispaniola, a great mare of the Tartarian breed, and "a little black hairy monster bred in the Deserts of Arabia." "A surprising young mermaid taken on the coast of Aquapulco" was shown in 1748.

Philip Astley, who was born in 1742, had served in a cavalry regiment with distinction, and on his discharge from the army, having already learned some feats of horsemanship, in 1770 began his open-air performances at Lambeth, which were received with such favor that he repeated them in various cities and towns. After a time he built a rude circus near Westminster Bridge, only the seats being roofed over, exhibiting his trick-horse at an earlier hour each day in a room in Piccadilly, where the performance was eked out with conjuring and a shadow pantomime. One of the earliest advertisements of Astley's that has been preserved mentions as the programme of the entertainment "horsemanship by Mr. Astley, Mr. Taylor, Signor Markutchy, Miss Vaugable, and other transcendent performers," a minuet by two horses, a comical musical interlude, *The Awkward Recruit*, and "an amazing exhibition of dancing dogs." Out of the proceeds of these performances Astley built and opened the Amphitheatre in 1780, the programme of the time including the "Chinese shadows," feats of horsemanship, tumbling, performances on the slack-rope, ladders, and chairs, a burlesque equestrian act by the clown, and the "Egyptian pyramid of men piled on men." About the same time the Royal Circus (afterwards the Surrey Theatre) was erected in Blackfriar's Road by the elder Pidsin and an equestrian named Hughes, soon passing under the management of the first Grimaldi: it competed keenly with Astley's, combining with equestrianism burlettas, dances, singing, pantomime, and fireworks. At this time (1783–84) Astley had made several successful visits to Paris, upon one occasion, according to Decastro, averting an infringement of the monopoly of a French performer by building a platform for his acrobats which was supported on the backs of horses—a real ambulant theatre; he soon after erected a large circular theatre in the French capital and built another in Dublin. The younger Astley (elder was according to Walpole, a great favorite with Marie Antoinette.

Though the modern circus had thus been finally established and had received its directing impulse, its development was so slow that for fully a generation after the opening of Astley's Amphitheatre "the performances did not differ in any respect from the usual entertainment of the smallest tenting company now travelling." A stag-hunt introduced in the Royal Circus was almost the only novel feature for many years. Astley's was burned down in 1794, and again in 1803, and each time rebuilt instantly by the courageous old man, whose boast was that he had built nineteen theatres. The era of "horse spectacles" began with *The Blood-Red Knight*, brought out in 1810, running a whole season and netting a profit of £18,000. Horses, elephants, and camels were introduced at Covent Garden in 1811 in *Bluebeard* and *Timor the Tartar*. Philip Astley died in 1814, and his son in 1821, when Davis succeeded to the management, which in 1830 was taken by Andrew Ducrow, for some time the star rider of Europe. Ducrow, who was born in Southwark in 1793, was famous as a pantomimist ere he became an equestrian. He was the originator of the *poses plastiques*, a series of studies of classical statuary on the back of a horse, and later, at Franconi's, was the first to introduce the equestrian pageant known as an *entrée*. After a single season at Astley's, Ducrow went to Paris, returning to London in 1824, where he made the fame of the Amphitheatre, introducing the then unparalleled feat of riding six horses at once. In 1828, Davis brought a performing elephant into the arena, and in 1831, Ducrow, one of whose new riders was the first of the famous Stickneys, produced the spectacle of *Mazeppa*. A mimic Spanish bull-fight was given a year later. Ducrow died in 1842 of the shock received at the burning of Astley's for the third time, and the Amphitheatre was rebuilt and reopened by William Batty, a clever equestrian and a manager of great enterprise. In 1855 Astley's was taken by William Cooke, who retired in 1860; Batty then returned for a brief space; then, in 1862, Mr. Boucicault transformed the Amphitheatre into the unsuccessful Theatre Royal, Westminster; and in 1868 the place was finally sold.

Tenting or travelling circuses came into existence in England between 1805 and 1830. At first they were upon a most modest scale, and were met with chiefly at fairs. There were rarely more than three or four horses, of which perhaps two appeared in the arena, and the performances were short, consisting of two or three acts of horsemanship, some tumbling and feats on the tight-rope; but the programme was repeated as often as the tent could be filled from noon until midnight. But as the taste for equestrian and acrobatic performances increased, with the increase of wealth the travelling companies became stronger and more numerous, and permanent amphitheatres were erected at Liverpool, Birmingham, Sheffield, and other large cities and towns. Of the modern circuses in England, Hengler's and Sanger's have been among the most notable. The first Hengler was a rope-dancer at Astley's in 1807, and his descendants had been tenting for a long time ere they established themselves, first at Liverpool and other provincial towns, and finally, in 1871, at London. The Sangers, after performing for some seasons at Agricultural Hall, bought Astley's, or the Royal Westminster Theatre, and made it their headquarters during the winter months, spending the summer in visiting the principal provincial towns. The Newsomes, Cookes, Pinders, and other families noted in English circus annals, and all the prominent companies, are fully de

in Thomas Frost's *Circus Life and Circus C*... (London, 1875). See also the same author's *... Old Showmen and the Old London Fairs* (Lon... 1874); C. W. Montague's *Recollections of an Eques... Manager* (London, 1881), and, for the early history Astley's, the Circus Royal, etc., the *Memoirs of J. ...ecostro* (1824). It may be added here that the in... duction into the circus-ring of famous pugilists is ... of recent origin, Astley having engaged "Dutch ..." and other prize-fighters for the Olympic Pavil... about 1807. Of other European circuses, that of ...coni at Paris, established by Astley about 1804, ... passed into history with the English Amphitheatre, ...d the Circo de Price of Madrid is probably the finest building of the sort in the world.

The history of the circus in America it is difficult to ... with even approximate accuracy. The profession found no systematic historian, nor has there existed ... an establishment as Astley's to facilitate the labor ... investigation. The bills of early shows have not been ...rved, and the recollections of early performers and ...agers even are very deficient in dates, while where ...re given they are usually inconsistent with other ...ements resting on similar authority. So far as rec... ...an be trusted, the circus business in the United ...eems to have begun at about the same time as ... ...nd, and the final divergence between the cir... ...of the two countries is due to obvious causes. ...kets seems to have been the American Astley, ...s show in Philadelphia was, we are told, visited ...on and his staff in 1780. With Rickets ... ...afterwards associated a Frenchman named ...d or Bouchard, who became sole manager upon ...'s death. Several other companies were estab... ...before the close of the century, but it was not ... the decade 1820–30 that the American circus at... ...d to real importance. Even then the average show ... very modest affair. A company with eight horses ... many performers was a strong one. The "tent" ...ely an enclosure of canvas, seats had not yet ...vised, and the advertising arrangements were ... primitive, a single poster of one sheet serving to ...he curiosity of a village. The circus, travelling ... ...evening performances being practically impos... ...because of the absence of any device for illumi... the ring), announced itself at daybreak, and the ...mme included only feats of strength, leaping, ...ng, rope-walking, riding without a bridle, and like ...ple performances, the place of the clown being taken ... a comic vocalist. About 1830 more ambitious ideas ...gan to prevail; the mammoth show of Purdy, Welch ... Co. took the field with twenty-four gray horses and ... ...and of eight pieces; the real tent was substi... ...for the canvas enclosure; a method of lighting ...he ring with candles in a frame around the centre-pole ...as devised; the corps of canvasmen, charged with the ...ork of pitching the tent and preparing the ring, came ...o being; and an advance-agent was employed. His ...es at first were to precede the circus by but a day ... ...o, and by his conversational powers and popular ...ners work up the people of the town to a profitable ...ch of excitement, the arrival of the troupe and its ...rand parade completing the work. In due time he ...ttained to the dignity of a special vehicle, nor was it ...ng before posters and advertisements were called upon ... ...e, and not merely to reinforce, his eloquence. ... circus-bills, in the proper sense of the word, ...e been employed about 1840 to announce ... ...ances of Van Amburgh. It is doubted by veteran managers whether the excellence of the circus-performer has grown as notably as the importance of the show. The earlier companies required that each of the members, so few in number, should possess more than one accomplishment, whereas now all the rage is for special performers. It may be doubted whether the *rôle* of the jester is of so great importance now, when the audiences are so large that his quips cannot be caught.

During the twenty years preceding the circus made a rapid advance in merit and in popularity. Bareback riding grew in favor, and more showy gymnastic performances—the *trapeze*, unknown to earlier showmen—came into vogue, and there was a notable increase in the splendor of the equipments and accessories. About 1860 the American circus entered upon the railroad period, and "the road" was abandoned by all the great companies. Within the last few years these companies have entered upon a new stage, owning their own railroad-trains and advertising-cars, and as the larger organizations are swallowing up the smaller ones or forcing them out of the field, the time seems near at hand when there will be a practical monopoly of the business, and, to avoid disastrous competition, arrangements will be made as to territory and dates at the beginning of the season. In one department an ambitious modern experiment has proved a failure—the mammoth combinations with double or triple rings being regarded as disadvantageous, as the spectators are unable to follow two or three simultaneous performances. Instead of the company being recruited under the apprentice system, the special performer now seeks his engagements independently, and, as a rule, brings with him his own stud of trained horses or his own troupe of performing animals.

A great American circus is a singularly complicated and costly enterprise. The route for the season having been selected—here the railroad system is of priceless advantage, as long runs can be made at night after the performance—the railroad-contracting-agent sets out to make arrangements for transportation and assure himself that the tunnels and bridges on each line will permit the passage of the cars. He may be said to precede the show by three months, and is followed by the contracting-agents, who a month or six weeks before its arrival have concluded arrangements for supplies of food and forage, leased sites, and obtained licenses and billboard privileges. A few days later comes the first advertising-car, gorgeous with paint and gilding and loud with a steam-organ or some similar musical apparatus, and containing paste-vats and posters (some made up of no less than 64 sheets), and a force of men who proceed to display the placards, mail circulars, and distribute lithographs. It is followed closely by the excursion-agent, who arranges for special trains from the neighboring towns on the day of exhibition, and advertises time and rates. A second advertising-car follows with a new set of posters, and all imaginable devices for obtaining publicity are resorted to by the press-agents, school visitors, distributors of bills and lithographs, exhibitors of stereopticons, etc., etc., who complete the work of advertising the performance. Where one contract for $70,000 worth of posters has been made, and a single company has been preceded by 70 or 80 agents and subordinate employés, to say nothing of the intelligence-corps, charged with obtaining information as to all local affairs, such as the condition of crops and trade or the days on which wages are paid and fairs or gatherings are held, it is not difficult to understand that

scores of thousands of dollars have been expended before the first performance is given.

The main body of the army, to carry out a military comparison, follows the scouts and advanced guard in one train or two or three trains, according to the size of the company. Everything has been packed with due regard to convenience and economy of space, and the men have been drilled in their duties till they have acquired military accuracy and promptitude. Where such a circus company includes from 500 to 600 men, 300 or 400 horses, 20 elephants, and some hundreds of show animals, and a number of tents, one of which is 500 feet by 300, the necessity for system and skill is apparent. The largest canvas outfit yet made for an American circus cost about $43,000, the tents and their dimensions being as follows: Circus tent, 466 × 270; menagerie, 370 × 120; museum, 210 × 100; dressing-room tent, 170 × 90; cottage entrance, 40 × 40; seven horse-tents, each 40 × 90; two side-show tents, each 100 × 60; seven refreshment-tents, each 30 × 20; cook-house tents, one 100 × 40, and two others, each 70 × 38; kitchen-tent, 40 × 40; blacksmith-tent, 45 × 40; barber-shop, 45 × 40. To handle this canvas 300 canvasmen are required. As three performances are frequently given in the day, and always two, work is begun at the moment the trains arrive. The forage-wagon is first despatched, unless a local contractor has been resorted to, and the horse-tents and those for the graminivorous animals are set up, while simultaneously the cooks prepare breakfast and the smiths begin work upon jobs of horseshoeing or repairs. While the surveyors are laying out the canvas city their assistants follow them with tent-stakes, which are no sooner dropped than they are driven home, the work of clearing and levelling the arena proceeding while the poles are rising to receive the canvas. Even more important than the levelling and banking up with nicety and solidity of the ring is the work of setting up the machinery for the performances, solidity of construction being not of greater consequence than accuracy of adjustment, so that the same feat shall day after day be attempted under absolutely identical conditions. The morning parade is not merely an advertisement, but serves the purpose of giving the horses and other animals their desirable daily exercise. When the performance is concluded at night the work of removal is as swift and systematic, a notable gain of time resulting from the employment of sleeping-cars.

For the performance itself it is difficult to say what the programme of a great circus does not offer, the staple of course remaining feats of horsemanship and gymnastics and exhibitions of wild beasts in cages or of trained animals. In the department of sensational gymnastics notable progress has been made of late years by the introduction of machinery, such as powerful combinations of springs shooting the performer many feet into the air, cannon from which performers are shot by the force of springs or in some cases of gunpowder, and apparatus for "aërial dancing," with which, by the employment of springs, counterbalancing weights, and invisible wires, the dancer bounds down from or up to extraordinary heights. No little progress, too, has been made in training young equestrians by the introduction of the "mechanic," a cord-and-pulley arrangement fastened to the rider's clothing, the cord running through an arm working freely about a central post, and being held by the trainer, who in the event of a fall or a misstep, prevents the rider from receiving any shock or injury that would at least impair his confidence. Not only is the process of education for the ring severe, but the business itself, when once mastered, demands sobriety and constant training, intemperance, or even indolence, being injurious to nerve and muscle, which must always be at their best. So exacting is the work during the season, which lasts from 24 to 30 weeks, that the performer, even if he could safely indulge in dissipation, lacks the time. Nor are the rewards of the profession great. Bare-back riders may be set down as receiving from $100 to $200 a week during the season, and pad riders from $70 to $100. Clowns may obtain salaries of from $30 to $100. Giants, if well known and popular, may command $200, but a new giant will not obtain more than a tenth of that sum. About the same salaries are paid to dwarfs, in whom intelligence is an important consideration. The prices paid to curiosities range from $5 to $500 a week, the double-headed woman commanding the latter remuneration, and the average "beautiful Circassian" the former. As for ordinary performers, their wages are moderate and are well earned. As the engagements close with the season, and many of the performers own their own studs or troupes, the manager's expenses are greatly reduced during the winter, though the cost of maintaining a huge stable and a large menagerie, with from 15 to 20 elephants, in idleness is still very great. The solution of the problem, How to utilize a great circus in winter-time? will probably be found in permanent buildings in the great cities, and performances from which the most costly special attractions will be eliminated, dependence being rather placed upon regular "acts," such as found favor at an earlier day. When it is remembered that the running expenses of a great circus are from $3000 to $4000 a day, that the menagerie will represent an investment of half a million or more, and that the accident of bad weather, a poor crop, a heated political campaign, or an epidemic is always to be looked for, the responsibility undertaken by a manager and the necessity for the employment of the greatest skill and the most careful economy will be apparent.

For a long time the circus in the United States, especially in New England, was placed under the ban as a thing disreputable, immoral, and vulgar. Through the cleverness and foresight of the most prominent of modern managers, who have skilfully kept in the foreground the educational influences of the menagerie, and have enlisted leading divines and local celebrities in the work of praising their "great moral shows," these prejudices have been overcome, and where the circus is not popular now it is upon economic rather than upon moral grounds. Th in some districts of Michigan the mining compan ve nl d the railroads under bonds not to bring ou or nageries into their territory on account of the m of the workmen. At Paterson, N. J., it l vously been attempted to keep circuses out by put the lic up to $1000, and now, when the show i on i mills are shut down. At Newark the i estimate their loss through the visit o a c $15,000 a day. At Montreal in 1882 cir were forbidden at the request of the R clergy. Bodies of sharpers and pickpocl are follow a company on its travels, and to take ad the crowds and the laxity of rural police i ply their dishonest trades. Howe ganizations have come into existence classes of hangers-on have been driven as disorder and crimes of violence are

to say that the circumcised are much more frequently sufferers than aggressors. (See MISSIONS. § 2 i.)

[Memo.—The dates for this article were completed in 1888.]

CISSEY, EDMOND LOUIS OCTAVE CHOUARD DE (1810–1882), a French general born in Paris Dec. 21, 1810, of a noble Burgundian family. He studied at St. Cyr, 1830–32, became a sub-lieutenant, and then entered the school of the general staff, and major, becoming in 1835 lieutenant and aide-de-camp to Gen. Tiffeil, and serving with marked ability in Algeria for many years. He went into the Crimean war as a colonel, and in 1854, after the battle of Inkerman, was made a general of brigade: in 1861 he was made a general of division. He served under Bazaine in the Franco-Prussian war of 1870, and opposed the capitulation of Metz, where he was made prisoner after having striven in vain to mitigate the terms of the surrender. In 1871 he took part against the Communists of Paris, and by a skilful movement gained control of all that part of the city on the left of the Seine. Chosen to the National Assembly from Ille-et-Vilaine, he was (1871–74) minister of war, for a part of that time commanding also the seventh corps d'armée. In 1874 he succeeded Duc de Broglie as minister of the interior and vice-president of the council. In 1875 he again became war minister, and in the same year was made perpetual senator. He relinquished his portfolio in 1876, and in 1878 took command of the Eleventh Army Corps. He resigned his commission in 1880 in consequence of grave charges respecting his public and private conduct, and although in 1881 the gravest of these accusations were declared by a committee to be unfounded, he was not thereafter allowed to resume his old position in the army. He died at Paris, June 16, 1882.

CISTERNS. These receptacles for the storage of water of course vary in size according to their requirements from the subterranean reservoir containing 100,000 gallons to the small house-tank of 200. To preserve the purity of the water it is especially necessary to cover them, so as to exclude the sunlight, which otherwise causes a rapid development of the inferior forms of life and soon causes the water to become unfit for use. In underground cisterns the bottom should be on solid or homogeneous ground, so that unequal settlement may not produce cracks. On this foundation a concrete made of stones of the size of a walnut and hydraulic cement, and if the depth of water is not over ten feet of a thickness of eight inches, is put on in two layers, the lower one being allowed to set before the upper one is put on. The walls may be made of stone, with a lining of bricks, well wet and thoroughly bedded in hydraulic cement. Their thickness at the bottom should not be less than three-sevenths of the height. The top may be covered with flag-stones or with an arch, leaving a man-hole, covered with a stone, for repairing or cleaning. On the outside a trench about two feet wide and three or four feet deep had better be filled with some porous substance like furnace-cinder, to prevent the evil effects of frost.

Cisterns in houses, when large, are made of a cylindrical form, of boiler iron, of a thickness of one-eighth of an inch for the top ring, reaching two and a half feet from the top, and with each lower ring one-sixteenth of an inch thicker than the one above. The rings encircle each other telescopically, and are riveted and caulked on the edges like boilers.

Large wooden tanks are made of cedar. They may be seventeen feet wide at the top and increase in

diameter one foot in a depth of eight feet, so that iron hoops placed at top may be driven over them, and the tapering form will force together the staves of which the tank is composed. These staves are about two and a half inches thick and made in the proper shape by machinery, and the iron hoops, of one-quarter of three inches section, are placed two close together at the bottom, one at the top, and three intermediate ones at distances apart increasing towards the top, so as to resist the additional pressure of the water due to an increased head.

The small cisterns in houses, principally used for flushing drain-pipes, are usually made of wood lined with sheet-lead, and contain about 20 gallons. If the water is used for drinking, and is frequently changed, there is no objection to the lead-lining, which, however, is said to poison water which remains in contact with it for a great length of time. Sometimes these tanks are made of glazed earthenware, which is an excellent material. There should always be a waste-pipe near the top, to keep the water from overflowing the sides.

It may be mentioned that throughout Palestine cisterns have existed from the earliest times. The "pit" into which Joseph was cast by his brethren, as related in the book of Genesis, was a rock cistern for storing water for flocks, which is said to have been dry at that particular time, and many of the "wells" of Scripture were probably similar in character.

W. M. C.

CITIZEN. Latin *civis*, an inhabitant of a city who is entitled to all rights and privileges as such; in a broader sense and according to modern usages an inhabitant of a political district of territory owing allegiance to the government, and whose person and property the government is in turn bound to protect. The term took its rise from the peculiar privileges which were vested in freemen living within the limits of the ancient city of Rome. The Roman law, strictly speaking, was applicable to men only. All foreigners were governed by the *jus peregrinum* or *jus gentium*. As the power of Rome extended over Italy, the inhabitants of many of the other Italian states became vested with the privileges of Roman citizenship. In process of time the privilege was conferred upon the leading men of the colonies, either as a reward for distinguished military service or for some other cause. In the time of the empire the right of citizenship might be purchased for a considerable sum. It was reserved for Caracalla, however, completely to prostitute the title of Roman citizen. He forced the inhabitants of all the provinces to assume it, and then subjected them to heavy taxation beyond what had before been imposed upon them.

The term "citizen" is not known to the English law: the term "native" is used as synonymous with it. A "native" was by the common law defined to be any person born within the king's dominions or born abroad of English parents. The statutes of 25 Edw. III. c. 2, 7 Anne c. 5, and 4 Geo. II. c. 21 have somewhat altered the law in this respect; all persons born within the king's dominions are natives, and any person born abroad whose father is an English native-born subject is in like manner a native.

All persons are citizens of the United States who are within the jurisdiction and allegiance of the United States, and a person may be a citizen of the United States without being a citizen of any particular State. A citizen of one State is by the Constitution guaran-

teed the rights and privileges of citizenship in every other State. Persons born within any part of the territory now belonging to the United States, but who withdrew therefrom prior to the acquisition of the territory in question by the United States, are not accounted to be citizens thereof. All persons born out of the limits of the United States whose fathers were at the time of their births citizens are entitled to the like privilege, but the right of citizenship does not descend to persons whose fathers never resided in the United States. An alien may become a citizen provided he has resided in the country for five years and is duly naturalized according to the provisions of the Act of Congress. (See NATURALIZATION.) Women, married and single, are citizens, and so are minors; but an Indian is not a citizen unless he has abandoned his tribal relations and been duly taxed. By the Fourteenth Amendment to the Constitution of the United States negroes and all other races born or naturalized in the United States are made citizens thereof, and of the particular State in which they reside.

Every person owes allegiance to the state whereof he is a citizen, and the question has been much mooted as to whether he is ever at liberty to shake off his allegiance. It was formerly well settled in England that no English citizen could by removal, naturalization, or otherwise renounce his allegiance to the British Crown. The same principle also formerly obtained to some extent in the United States. The doctrine of perpetual allegiance is now, however, generally abandoned among civilized nations. The right of personal expatriation is secured by numerous treaties, and is fast becoming, if it has not already become, an acknowledged principle of international law.

A citizen is entitled to claim from a state, in return for his allegiance, protection for his person and property. He has, therefore, always a right to sue in its courts and to demand police protection and such diplomatic negotiation with foreign powers as will ensure his safety and right of property. A wrong to the person or property of a citizen is by the law of nations a well-recognized *casus belli*. A citizen is not, however, entitled, as such, to exercise the electoral franchise. Women and minors, therefore, though citizens, are not entitled to vote. (L. L., JR.)

CIVIL DEATH, the state of a person who, though possessing natural life, has lost all his civil rights, and as to them is deemed dead.

In England, in ancient times, any one banished or abjured the realm, or who had entered into religion and become a monk professed, was regarded as civilly dead. So where a man was excommunicated by the proper ecclesiastical authority or attainted by due process of law.

The doctrine of civil death is generally considered obsolete. It is, however, said that in the State of New York any person convicted and attainted of felony and sentenced to the State prison for life is to be regarded as civilly dead. (L. L., JR.)

CIVIL RIGHTS are those which are accorded to a person simply as a member of a community or nation. By virtue of the provisions of the original Federal Constitution and the first twelve amendments thereof, certain rights are guaranteed which are in their nature almost purely civil. Such are the right to the writ of habeas corpus, immunity from *ex-post-facto* laws, equality of taxation, freedom of religion, of speech, and of the press, the right to assemble peaceably and to petition the Government for a redress of grievances, the right to bear arms, immunity from the quartering of soldiers in any house in time of peace, immunity against general warrants, the right to trial by jury, the right in criminal cases to a grand jury, immunity from being twice put in jeopardy of life or limb for the same offence, immunity from the obligation to testify against one's self, the right to a speedy trial, to have a copy of the indictment, to be confronted with the witnesses, to have compulsory process to compel the attendance of witnesses, and to have the assistance of counsel, immunity from excessive bail and from cruel and unusual punishments. In addition, it is provided that no persons shall be deprived of life, liberty, or property without due process of law, and that private property shall not be taken for public use without just compensation. Substantially similar provisions are inserted in the Bills of Right embodied in the various State constitutions. The civil rights thus guaranteed, though apparently ample at the time of their enactment to secure the rights of the people, were found towards the close of the War of the Rebellion to have become inadequate for that purpose. The ratification in the year 1865 of the Thirteenth Amendment to the Constitution, abolishing slavery and involuntary servitude throughout the United States, occasioned a great change in the whole social status of the population. Among the first acts of legislation adopted by several of the States in the legislative bodies which claimed to be in their normal relations to the Federal Government were laws which imposed upon the colored race onerous disabilities and burdens, and curtailed their rights in the pursuit of life, liberty, and property to such an extent that their freedom was of little value. They were in some States forbidden to appear in the towns in any other character than menial servants. They were required to reside on and cultivate the soil, without the right to purchase or own it. They were excluded from many occupations of gain, and were not permitted to give testimony in any of the courts in any case where a white man was a party.

These circumstances forced upon Congress the adoption of some measures by which the rights of the freedmen, in accordance with the manifest intention of the Thirteenth Amendment to the Constitution, might be ascertained and enforced. Accordingly, on April 9, 1866, a bill was enacted designed to protect all persons in the United States in their civil rights and to furnish the means of their vindication. It was by the terms of this act provided that all persons born in the United States, and not subject to any foreign power, excluding Indians not taxed, should be deemed citizens of the United States; and that such citizens, of every race and color, without regard to any previous condition of slavery or involuntary servitude, except as a punishment for crime whereof the party should have been duly convicted, should have the same rights in every State and Territory of the United States to make and enforce contracts, to inherit, purchase, lease, sell, hold, and convey real and personal property, and to the full and equal benefit of all laws and proceedings for the security of person and property as were enjoyed by white citizens, and should be subject to like punishments, pains, and penalties, and to none other; any law, statute, ordinance, regulation, or custom to the contrary notwithstanding. The act then further imposed certain penalties for the violation of the rights therein declared, and gave appropriate criminal and civil remedies. The provisions of this act were no doubt sufficiently explicit, and, if valid, were admirably calculated to guard those rights which they were intended to

secure. There was, however, serious reason to doubt the constitutionality of the measure. In the year 1856, Chief-Justice Taney had in the case of Dred Scott announced that persons of the African race, though free, were not citizens of the United States within the meaning of the Constitution, and were therefore not entitled to any rights and privileges as such. However much the current of popular feeling might have altered, this decision remained unreversed as the judgment of the supreme tribunal of the land. It was more than doubtful whether Congress could confer citizenship and the rights of citizenship upon a race whom the Supreme Court had pronounced not to be entitled thereto under the terms of the Constitution. Moreover, even if the validity of the act was admitted, it was thought that the rights of a class of persons still suffering under a ban of prejudice could never be deemed entirely secure when at any moment it was within the power of an unfriendly majority in Congress to strip them of those rights by repealing the act by which the rights had been conferred. It was evidently most proper to have those rights settled in the most authoritative and conclusive manner. A Fourteenth Amendment to the Federal Constitution was accordingly proposed by Congress to the legislatures of the various States on June 16, 1866, in the terms following: "All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the States wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the law." Subsequent sections declared the mode in which representatives should be apportioned among the several States; prohibited the denial of the franchise to any male citizen twenty-one years of age, except for participation in rebellion or other crime; prohibited any person who had taken an oath of fidelity to the United States, and who had subsequently engaged in insurrection or rebellion against the same, from filling any national or State office, unless Congress by a two-thirds vote should remove the disability; established the validity of the public debt; forbade the assumption either by a State or by the United States of any debt incurred in aid of insurrection or rebellion against the national Government; prohibited in like manner the assumption of any claim for the loss or emancipation of any slave; and conferred upon Congress the power to enforce all the foregoing provisions by appropriate legislation. This amendment was ratified by the legislatures of thirty out of the thirty-six States, and was accordingly, on July 28, 1868, duly promulgated as part of the Constitution.

The main purpose of the Fourteenth Amendment was to secure to the colored population of the country the rights and privileges of citizenship. Its operation was not, however, confined solely to such persons. It applied equally to persons of all other races born or naturalized in the United States. Congress has enforced the amendment by a very stringent enactment approved April 20, 1871, by the terms of which it is in substance provided that any person who shall, under color of law, subject or cause to be subjected any person within the jurisdiction of the United States to the deprivation of any rights, privileges, or immunities secured by the Constitution, shall be liable to the party injured in any action at law, suit in equity, or other proper proceeding for redress. Jurisdiction over all such proceedings is vested in the United States courts, and the right of appeal secured. Further stringent provisions are made in case of conspiracy or insurrection to deprive any such person of his rights or immunities, the President being authorized to employ the land and naval forces of the nation to suppress such conspiracy or insurrection, and even, if necessity requires, to suspend the privileges of the writ of *habeas corpus*.

Other and further provisions of the same kind have since been adopted. By the act of Feb. 16, 1875, it is provided that no person shall be disqualified for jury service on account of race, color, or previous condition of servitude, and it is made a misdemeanor for any officer charged with the summoning of a jury to make a discrimination illegal under the above act. The right of Congress, however, to legislate upon this subject is limited. It cannot establish rules of law for the regulation of private rights generally. This is the appropriate function of the States. It can only provide modes of redress against the operation of State laws and the action of State officers when these are subversive of the fundamental rights specified in the Fourteenth Amendment to the Constitution. It has been accordingly decided by the Supreme Court of the United States (Oct. 15, 1883) that a law providing that all persons within the United States shall be entitled to the full and equal enjoyment of the accommodations, advantages, facilities, and privileges of inns, public conveyances, theatres, and the like, subject only to the conditions and limitations established by law and applicable alike to citizens of every race and color, regardless of any previous condition of servitude, and imposing a heavy penalty for the violation of its provisions, is unconstitutional and void. Whether, however, Congress has a right by appropriate legislation to prevent such discrimination, should it actually occur or be sanctioned by State laws, has not been determined.

The provisions of the Fourteenth Amendment have received judicial construction in a great number of cases. It has been decided that they do not require merely equality of privileges and immunities, but that the same shall be absolutely unabridged and unimpaired. States may, however, pass laws regulating the privileges and immunities of their own citizens, provided they do not abridge the privileges and immunities of citizens of the United States. The States may therefore, it seems, prohibit miscegenation, the sale of intoxicating liquors, and the like, and may restrict the right to practise law to the male sex. In California it has been decided that a State law is valid which excludes Chinese from testifying in any cause to which a white person is a party. It seems, however, that this law must, under the Civil Rights Bill, be so construed as to exclude the testimony of Chinese for or against negroes equally with whites. Any State may pass appropriate police laws for the protection of the health and morals of its citizens, and these will not be deemed invalid, even though they may incidentally restrict the immunities or privileges of citizens of the United States. Although it is clear that the right to serve upon juries must be enjoyed indifferently by the colored race and the white, it by no means follows that it is a portion of the privileges or immunities of a colored citizen to have a jury in a cause to which he is a party partly composed of his own race. The contrary has been decided by the Supreme Court of the United States. All State laws or parts of laws inconsistent

with the provisions of the Fourteenth Amendment to the Constitution were abrogated by its adoption.

The rights secured by the Fourteenth Amendment were, it will be observed, solely the rights of citizenship in the United States. No rights, therefore, not necessarily appendant to citizenship were conferred by the constitutional grant. The right of suffrage is not necessarily implied from citizenship. Women, for example, have always been deemed citizens, and yet generally have been denied the right of suffrage. Hence this right is not regarded as having been conferred upon them by the Constitution where it is withheld by the laws of the State in which they reside. For the same reason the grant of citizenship to the negro was not deemed to carry with it the right of suffrage. Popular sentiment was, however, overwhelmingly in favor of conferring this right. Accordingly, on Feb. 26, 1869, a Fifteenth Amendment to the Constitution was proposed by Congress, and, being duly ratified, was on March 30, 1870, promulgated as part of the Constitution. This amendment reads as follows: "The rights of citizens of the United States to vote shall not be denied or abridged, by the United States or by any State, on account of race, color, or previous condition of servitude. The Congress shall have power to enforce this article by appropriate legislation." Very stringent acts to enforce the rights of citizens of the United States to vote in the several States of the Union in accordance with the provisions of the above amendment were passed on May 31, 1870, and Feb. 28, 1871, all of which still remain in force.

The provisions of the Fifteenth Amendment invest the citizens of the United States with a new right within the protecting power of Congress. They take away the authority of any State to discriminate against citizens of the United States on account of race, color, or previous condition of servitude, but leave the power of the States to discriminate upon all other grounds, including that of sex, intact. Without doubt, the adoption of this amendment "completes the greatest civil change and constitutes the most important event that has occurred since the nation came into life."

(L. L., JR.)

CIVIL SERVICE REFORM is the name given in the United States to certain changes in the mode of appointing subordinate officers and in the conditions of their tenure. These changes are—the substitution of some mode of securing admission to the service of the Government which shall be accessible to all for selection through the favor either of the President or of members of Congress; the substitution of tenure either during good behavior indefinitely or for a fixed term for tenure at will; and promotion through merit or seniority for promotion through the favor of either the President or members of Congress. As to what this mode shall be there is the preponderance of opinion among the advocates of the change in favor of competitive examination, open to all within certain limits of age and with proper testimonials as to moral character, the questions to be so framed as to ascertain the possession of the elementary branches of an English education and of such special practical knowledge as the vacancy to be filled may call for. It is proposed also that success in the examination shall be followed by a period of probation in the office itself preliminary to a permanent appointment. There is, however, a considerable number of the friends of the reform who object to the competitive examination as likely to trammel the appointing officer in his choice, and shut him up to persons deficient in the moral or physical qualities needed for thorough efficiency. These would leave the selection wholly to the head of the department in which the vacancy occurs, but would make the tenure either for good behavior or for a fixed term, and deprive the superior of the power of dismissal except for cause. Those who are of this way of thinking believe that if the power of arbitrary dismissal were taken away, superior officers would, for the sake of their own reputation, be careful in the selection of their subordinates, and that their judgment would prove in practice a surer test of fitness than any examination. The friends of competitive examination oppose to this view the consideration that without the power of arbitrary dismissal no head of a department can be held responsible for the proper administration of his office, but that abuses of this power would not occur if he were not permitted to fill vacancies except through the examination. The superior officer, they maintain, in other words, would only make vacancies for the good of the service if he knew that he would have nothing to do with choosing those who were to fill them. So that the advocates of the reform may be said to be divided into two classes—one composed of those who would effect it by restrictions on the power of dismissal, and the other of those who would effect it by restrictions on the power of appointment. The former would guard the exit from the service, the latter the entrance to it.

Out of the system of appointment by favor and dismissal at will the theory that the offices were the property of the party in power grew naturally, and found expression in the practice which seemed to have sprung up at an early date of inviting or compelling the officers, under a thinly-veiled threat, to make contributions from their salaries to the election expenses of the party, under the name of "assessments." This practice was defended by the argument that if the party were defeated and expelled from power the servants of the Government would all be dismissed by the victorious opposition, and it was therefore the interest of office-holders to help to pay the costs of repelling the assaults of the opposition at the polls. Their livelihood, it was said, depended upon the result of the election, and therefore their concern in this result was greater than that of other voters. Their dismissal was of course made certain by the previous exclusion of voters belonging to the opposition, as such, from the public service. It could not be expected that if one party when in possession treated the offices as its property, the other party when it came into possession would distribute and hold them on any different theory. Accordingly, as soon as the doctrine that "to the victors belong the spoils" was adopted by one party, its adoption by the other became inevitable. The practice of "assessing" the office-holders—or, in other words, of exacting money from them to be used in electioneering expenses—rapidly came into use, being represented to them as a fund for the defence of their places. The prohibition of such assessments therefore also forms part of the reform of the civil service.

The "spoils system," as the mode of selecting Government officers so long prevalent in the United States is called, has, in its main features, prevailed in Anglo-Saxon history from the earliest times down to our own day. It was not until the thirteenth century that ministerial offices in England ceased even partially to be considered the personal property of the sovereign, to be bestowed as he pleased without regard to the fitness of the appointee for the duties of his place.

the whole Norman period, properly so called, sold freely to supply the needs of the . In the thirteenth century the growing people compelled some attention to fit- and restricted the practice of selling, but this e did not wholly disappear from the civil service the expulsion of the Stuarts, and a survival of it in the military service until 1870, and is still in Church in the right of selling the to livings not actually vacant. As arliament in the Government increased, ion of patronage with members of both houses y became to the minister of the day a potent of influencing votes, until at the accession of Victo the power of securing appointments of pendants was one of the well-recognized of Parliamentary supporters of the Gov-

however, worked better in practice in might have been expected, owing to the of the tenure. Members of Parliament to procure the appointment of their protégés for which they were unfit, but they were not ocure their dismissal without cause. There resulted from this the retention in office of mbers of unworthy persons; but, on the other , the security in their places, by delivering them ain kinds of temptation, gave free play to was best in them. If it did not furnish a l motive for good behavior, it removed one of t powerful motives for bad behavior. The rule of ence was not always strictly observed, however. the fierce party-contests in Parliament in the h century, opponents of the ministry or of were frequently punished by the dismissal s of their protégés, and on one occasion g the ministry of Lord Bute in 1762 he was ved to save himself from overthrow by making a dismissal of all Whig office-holders, high and giving their places to the majority who had by him in the House of Commons. But this t repeated. The theory of the office, which in ses made it salable, that it was the gift of the favored permanence, and would have continued it even if the growth of the reform sentiment er years of George III. and afterwards had the purchase of votes by the bestowal of easingly odious. The system began to be d in 1853, and was by 1870 almost completely by competitive examinations.

offices as were in the gift of the Crown in the American colonies were made, as those in Ireland were during the eighteenth century and down to the Revolution, the means of rewarding royal favorites or Parliamentary supporters of the ministry; but these offices were comparatively few in number, and the democratic constitution of colonial society, combined with the large share of the work of administration necessarily done by officers chosen by local election, prevented the English theory of the office-holder's position ever taking root on American soil. The offices never became in the ir eye anything but a trust, to be discharged for the public benefit. They never assumed the of private property, or of a position to which would have a title not derived from fitness or d behavior. This was true even of the Southern which great proprietors had preponderating influence, though perhaps not to the same of those of New England, in which equality of condition furnished the governing political principle.

After the adoption of the Federal Constitution the rule of tenure during good behavior was voluntary in regard to all officers appointed under it whose term of office was not fixed by the instrument itself. The removals made by the first six administrations, covering a period of forty years, were only seventy in all, all of them presumably on grounds of incompetency or misconduct. The question whether an officer's tenure should be affected by his political opinions did not, in fact, come up seriously for discussion until the accession for the first time of a new party to power through the election of Thomas Jefferson; and that it was raised then was due mainly to the bitterness of party feeling. The Federalists suspected the Republicans of hostility to social order itself, and the Republicans suspected the Federalists of hostility to the new Constitution. Under these circumstances the change had some of the characteristics of a revolution, and readily suggested to the victors sweeping dismissals among officers as necessary to the safety of the Government. Jefferson, however, resisted the temptation or the alarm, and laid down, and on the whole followed, the rule that he would rely for the introduction of a fair proportion of Republicans into the public service on "deaths, resignations, and delinquencies."

The rule of tenure during good behavior was not, in fact, set aside until 1820, when an act was passed limiting to four years the tenure of all accounting officers; that is, of all officers charged with the receipt and disbursement of the public money. The statute was intended to repress defalcation by compelling an accounting every four years on the part of the officers affected by it. But in practice it placed a large number of vacancies at the disposal of the President for the time being, without exposing him to the charge, which was still discreditable, of arbitrarily dismissing officers whose behavior had given no ground for complaint. Its real object was made still plainer by the provision that the terms of accounting officers whose commissions were dated Sept. 30, 1814, should expire on the day and month of their date next after Sept. 30, 1820. The act was condemned by the leading statesmen of the day, and its injurious effects were foretold. Jefferson in his retirement wrote "that it sapped the constitutional and salutary functions of the President, and introduced a principle of intrigue and corruption which would soon leaven the mass not only of Senators, but of citizens." In 1825, after practical experience of its working, an unsuccessful attempt was made to repeal it. This attempt was repeated ten years later, such Senators as Webster, Clay, Calhoun, Ewing, Southard, and White voting for the repeal and condemning the act in very emphatic language. But in the mean time Andrew Jackson had succeeded to the Presidency, and had formally treated the offices as the spoils of the victors by numerous arbitrary dismissals, amounting in the first year of his administration, according to one account, to 990, according to another to 690.

At all events, the principle of tenure at will was fully introduced into the practice of the Government and acted on for the reward of party services. It is true that Jefferson had laid down the rule that open opposition to the Administration for the time being would not be tolerated in the civil officers of the Government, but as long as he abstained from this no officer suffered from his opinions under him. Under Jackson dismissals took place either to punish obnoxious opinions or to make vacancies for persons with stronger

claims on presidential favor. The power thus assumed by the President had very soon to be shared with the Senators and Representatives as a means of ensuring support in Congress for presidential measures and nominations, until the practice grew up, which has lasted down to the present, of making appointments mainly on the recommendation of members of Congress belonging to the President's party, and making dismissals also on their simple demand. The abuses generated by this system through the appointment of persons not possessing the necessary qualifications for their places became so gross that in 1853 an act was passed prescribing a pass examination for certain candidates for certain places, to be conducted under the direction of the department in which the vacancy was to be filled; but this rapidly degenerated into a farce. When the appointment had been settled upon the examination was made such that the candidate could not fail to pass it.

After the war the great increase of offices necessitated by the growth of taxation and population caused fresh attention to be given to the spoils theory, and Pres. Grant appointed a commission to devise rules and regulations for admission to and promotion in the civil service. The commission made a report accordingly, prescribing competitive examination for admissions to the service, on which he acted in making appointments to some extent for a brief period from 1872. The pressure from members of Congress and politicians interested in the maintenance of the old system proved, however, to be more than he could resist, and he abandoned the experiment in 1875, before he left office. Pres. Hayes in 1879 revived the rules which were thus set aside so far as the New York post-office and custom-house were concerned, and in these establishments they have continued in force ever since.

The spoils system was, in the mean time, becoming daily more obnoxious through its operation in two or three States in which Federal officers were very numerous in aiding Senators to obtain and keep control of the nominating machinery of the party in power. The employment of the officers of the Government to manage the primary elections of the party and to fill the conventions with tractable majorities ready to carry out the wishes of a particular Senator, to whose hands the disposition of Federal offices within the State had been committed by the President, resulted in so much ostentatious indifference to the wishes and prejudices of the main body of the voters as to give a stimulus to the agitation for reform which it would probably never have received from any actual abuses in the transaction of the Government business. This stimulus was greatly increased by the open and persistent levying of contributions from office-holders by party committees for campaign expenses, by demands which the office-holders could not but consider as threats. To these agencies must be added the effect produced on the popular mind by the growing absorption of members of Congress in both Houses in the work of distributing patronage, and the resulting diversion of their time and attention from the work of legislation. The overwhelming defeats sustained by the Republican party in the States of Pennsylvania, New York, and Massachusetts in 1882 were construed as an emphatic popular condemnation of the system which had been in vogue since Jackson's day. Accordingly, an act of Congress was passed in January, 1883, providing for the regulation and improvement of the civil service of the United States by the appointment of a commission to draft rules governing appointments to the civil service, to be promulgated and enforced by the President. The commission drafted rules which have been practically tested under administrations of both political parties, and have given satisfactory results. The reform has been steadily extended in various branches of the public services and almost uniformly commended by the higher officials.

We have confined ourselves to the history of the civil-service reform question in the Federal service, because it is in that field that it has attracted most attention and is most important, there being over one hundred thousand Federal officers placed after each Presidential election, according to the spoils theory, at the disposal of the victors. The same system has, however, crept into State administration also, but is prevented from attracting as much notice there by the comparatively small number of appointed officers in State governments. That a change in the mode of selecting these, and in the tenure of their places, would follow a similar change in the Federal service, is generally believed. In New York a beginning of reform was made by the passage of an act, in 1883, prescribing competitive examination for appointments to the subordinate State offices, and to certain departments of the municipal government in every city having more than 50,000 inhabitants, to which the mayor should, in his discretion, direct its application. In 1884 the act was amended so as to make its application mandatory in all cities having over 20,000 inhabitants. There are numerous signs that the reform will gradually spread to all the States.

It is proper to add that the spoils system undoubtedly made its first appearance on this side of the Atlantic in New York, and prevailed in that State long before it was adopted by the Federal Government. The council of appointment which existed under the first State constitution was in the hands of the great families who for some time after the Revolution managed, if they did not constitute, the political parties within the State, and it used the offices without scruple to reward their friends and punish their enemies. The managers who arose under the Democratic constitution adopted in 1824, and who afterwards became a sort of political committee known as the "Albany Regency," inherited the traditions of the earlier period and continued its practices, and it was with their hearty support, and indeed under their auspices, that the spoils system was adopted in Washington by Pres. Jackson. (E. L. G.)

CLAIBORNE, William Charles Cole (1773–1817), an American statesman, governor of Louisiana, was born in Virginia in 1773. Having studied law, he settled in Tennessee, then a Territory, and was appointed a judge. He was a member of the convention which framed the State constitution of 1796, and was elected to Congress in the following year. After serving two terms he was appointed by Pres. Jefferson in 1802 governor of the Territory of Mississippi. When Louisiana was purchased from the French in 1803, Gov. Claiborne and Gen. James Wilkinson were appointed commissioners to take possession of the territory. Claiborne was made governor of the new Territory, March 26, 1804, and the government was organized in October. His task was rendered especially difficult by the heterogeneous character of the people over whom he was called to rule, while the absolute power lodged in his hands caused fear among the thoughtful. Some trouble was caused by the indefinite statement of the boundary of the country ceded, espe-

cially in the West, and for a time there were apprehensions of a war with the Spanish. The expedition of Aaron Burr also produced great excitement in New Orleans, but Claiborne by his moderate measures did much to allay the disquiet. His prudent administration secured some degree of harmony between the Creole planters and the American adventurers who came into the Territory after the change of government. In spite of various difficulties arising from the conflict of the old and the new laws, Claiborne succeeded in gaining the esteem of the people, and when Louisiana was admitted as a State in 1812 was elected governor. During the war with Great Britain he exerted himself for the defence of Louisiana, and especially when Gen. Jackson was ordered to the command of the troops at New Orleans expressed his gratification and did everything to second the general's efforts. In 1816 he was chosen by the legislature to represent the State in the United States Senate, but was prevented by ill-health from taking his seat in that body. He died at New Orleans, Nov. 23, 1817. See *History of Louisiana, American Domination*, by Charles Gayarre (New York, 1865). Other members of the same family were elected to Congress from Virginia and Tennessee at various times.

CLAIRVAUX (Lat. *Clara Vallis*), a town of France, department of Aube, and on the river Aube, ten miles above Bar-sur-Aube. It is celebrated for its old Cistercian abbey, founded in 1116 by St. Bernard in a desolate gorge previously peopled by robbers and known as the "Vale of Wormwood," but afterward called the "Bright Valley." Like the other glens of its neighborhood, the valley was then utterly waste and barely accessible, but is now extremely fertile and beautiful. (Plans and a description of the buildings are given in the ENCYCLOPÆDIA BRITANNICA, article ABBEY.) The grand monastery, for centuries the finest example in the world of a conventual establishment, is now one of the model prisons of France.

CLAIRVOYANCE (Fr. from *clair*, "clear," and *voir*, "to see") may be defined as the power of perceiving, without the use of the organ of vision, or under conditions in which the organ of vision with its natural powers alone would be useless. It comprises the sight of things past, present, or future. The word is also used in a broader sense to include *clair-audience* and *clair-sentience*, or the hearing and feeling of that which is imperceptible to the natural senses. Various methods of clairvoyance are recounted—by direct vision of things at a distance (opaque substances being no hindrance); by looking into a black surface, by looking into water, into a crystal, etc; or by laying the object to be described upon the forehead or chest of the clairvoyant. In the case of the seeress of Prevorst a paper could be read when laid upon the pit of her stomach; but clairvoyants now usually represent the cerebral region as the seat of illumination.

From remote antiquity the possession of such powers by favored individuals has been believed. In the Old Testament we find (2 Kings vi. 15, 16, 17) an account of the opening of the inner vision in the case of the servant of Elisha in answer to the prayer of the prophet. Clairvoyant powers were claimed for the Pythia at Delphi. Apollonius of Tyana and Diodorus Siculus testify to the clairvoyance of the Indian sages. Macrobius gives an instance of clairvoyance on the part of the oracle of the Heliopolitan god when consulted by the emperor Trajan. Tertullian speaks of a seeress who could prophesy and prescribe for the sick. Clairvoyance was known among the nations of antiquity, and is still generally accepted as an undoubted fact among Eastern nations. As instances of clairvoyants in later times may be mentioned Jacob Böhme (1575–1624) and Emanuel Swedenborg (1688–1772), the Swedish scientist and founder of the religious body called "The New Jerusalem Church."

The phenomena of clairvoyance have been carefully observed in the case of Madame Hauffé, the "Seeress of Prevorst," and recorded by her physician, Dr. Justinus Kerner, of Weinsberg (*Die Seherin von Prevorst*). From her childhood Madame Hauffé possessed peculiar powers, which increased as she grew older. She saw figures in crystal or in looking-glasses; by looking into a glass of water she could see forms and equipages, and describe them before they came in sight; she had prophetic dreams, possessed the second-sight, and predicted deaths by seeing funerals at houses where no one was ill at the time. She saw and conversed with spirits, and was conscious of what took place at a distance. Her clairvoyant powers were awake during what was termed her "magnetic sleep"—a state into which she fell spontaneously, but which might be induced by mesmeric passes over her body. The seeress was visited at Weinsberg by Schubert, Eschenmeyer, Görres, Werner, and others.

The clairvoyant state seems to be intimately connected with the mesmeric, the somnambulistic, and the so-called "biological." Mesmeric somnambulism and clairvoyance were first brought to notice by Puysegur in 1784. The clairvoyant is usually in a state of trance, which may be induced by mesmeric passes. In this state he is sometimes conscious only of his mesmerizer; in others, his clairvoyance is unrestricted. But the clairvoyant may enter the trance-state spontaneously, or he may even be in possession of his ordinary faculties, both of which characteristics are to be found in Zschokke, the German novelist. In "second-sight," as found in Denmark, parts of Germany, and especially in the Highlands of Scotland, the seer is not in a state of trance similar to that in other forms of clairvoyance. Whether the phenomena of clairvoyance are objectively valid or merely subjective is a debated question. They are accepted as objective by those who accept also apparitions, spirit-communications, and all those phenomena usually classed together as "occult," "magical," or "preternatural." Many frauds on the part of professed clairvoyants have been discovered, as in the case of Alexis and Adolphe Didier, examined by Dr. Forbes and Dr. Carpenter in 1844.

The following works may be consulted on the subject: Reichenbach's *Der Sensitive Mensch;* Dr. Gregory's *Letters on Animal Magnetism;* Howitt's *History of the Supernatural;* A. J. Davis's *Great Harmonia*, vol. iii., *The Seer*; Rev. Robert Kirk's *Secret Commonwealth* (1691); Martin's *Western Isles* and *Voyage to St. Kilda;* White's *Life of Swedenborg;* W. B. Carpenter's *Mesmerism, Odylism, Table-Turning, and Spiritualism.* (G. S. F.)

CLAM, a term applied to species of several distinct genera of acephalous mollusks, inhabiting the waters of almost all portions of the earth's surface. The common land-clam of the European and American coast is the *Mya arenaria* (family Myidæ), with a transversely ovate, subequilateral, convex shell from 3 to 5 inches in length and gaping at both extremities. The siphons are combined and covered with a partially retractile epidermis; foot small, straight, and lingui-

form. This species is common wherever it is found, burrowing in sand between high and low water, frequently to a depth of a foot or more, and indicating its presence by small apertures on the surface of the sand, through which communication is maintained with the outer world. This species, which is extensively used as an article of food, enjoys a very broad distribution, being found throughout the Northern and Arctic seas over almost the entire circumference of the globe. Belonging to the allied family of the Glycimeridæ (or still to the same family, Myidæ, according to some authors) are the "clams" of the genera *Panopœa* and *Glycimeris*, many of which are noted for their large size and for the extraordinary development of the siphons. This last feature is remarkably exhibited in the "geoduck," or great clam of the North American Pacific coast (*Glycimeris generosa*), which frequently burrows to a depth of two feet or more. A specimen in the possession of the Academy of Natural Sciences of Philadelphia, from San Diego, California, has the siphons developed to a length of upward of 2½ feet.

The highly-prized round clam, or *quahog*, which is found along the Atlantic coast from Massachusetts to North Carolina, and from the colored margin of the shell of which the aboriginal American tribes manufactured their well-known specie currency, the wampum, is the *Venus mercenaria*, a member of the family Veneridæ. The shell is solid, obliquely ovate, and very subequilateral; surface bluish-white, with numerous concentric, laminated ridges, which become obsolete toward the middle; inner margin stained violet. Animal with the mantle margins fringed; siphons unequal, more or less separate; foot tongue-shaped. Length about 3 inches, but sometimes considerably more. This species abounds in all our bays, being found from a few inches below the water-surface to a depth of six fathoms or more. The genus *Venus* is world-wide in its distribution, and embraces upward of two hundred species. Numerous fossil representatives occur in the strata of the Mesozoic and Cainozoic formations. The giant clam (*Tridacna*), of the family Tridacnidæ, is an inhabitant of the China Sea and the South Pacific and Indian Oceans. This is the largest bivalve mollusk with which we are acquainted, the valves of *Tridacna gigas* being known to measure upward of 2 feet in length and to weigh 500 pounds.

(A. H.)

CLAREMONT, a town of New Hampshire, in Sullivan county, beautifully situated on the Sugar River, near its junction with the Connecticut, 55 miles west by north of Concord. It is also on the Concord and Claremont Railroad, which at Claremont Junction, near the village, connects with the Sullivan Railroad. The Sugar River near Claremont falls more than 150 feet in the course of a mile, and its power is utilized in cotton-, woollen-, and paper-mills, and other manufactories. Claremont has a national bank, a savings-bank, six churches, the well-endowed Stevens high school, three newspapers, a large book-printing and stereotyping establishment, and a free public library. Population of township, 5553.

CLARENDON, Constitutions of, the title by which is known the famous statute passed in 1164 by the Great Council assembled at Clarendon to regulate certain matters of dispute between Henry II. and the clergy. The efforts of the clergy to augment their power in civil as well as ecclesiastical matters led at different times in history to many conflicts between them and the civil authority. One great ground of dispute was in regard to the mode of filling ecclesiastical benefices, the pope claiming that the right was exclusively in him, and the kings, on the other hand, maintaining as firmly their right to a controlling voice therein. The kings having the right to the possession of vacant benefices, this question was one of great importance, and the kings most grossly abused their right by keeping the benefices vacant for long periods while they enjoyed their revenues. This contest raged on the Continent as well as in England, and had been generally compromised in a similar way, the kings retaining a large portion of the authority they claimed. In England it was provided at the Conquest that such appointments should take place before royal officers, in the king's chapel, and with his assent, and the prelate elect was to do homage for his lands and hold them as a barony from the king, subject to all the feudal burdens of taxation and attendance on the king's courts. Another and still more important difficulty was that in regard to ecclesiastical jurisdiction; and this formed the main point at issue in the great dispute between Henry II. and Thomas à Becket. The Church claimed that persons in orders could only be held to answer before the ecclesiastical tribunals, and by indirect means had gone far towards obtaining much of the purely secular jurisdiction. The most severe punishment that could be inflicted in these courts being excommunication, manifestly their power to enforce civil remedies was grossly inadequate, let alone their power to punish for serious crimes. It thus came that many crimes committed by ecclesiastical persons went without fit punishment; and this very immunity, of course, had the effect of largely increasing the number of crimes committed by persons of that class. These troubles came to a climax in England in the struggle between Henry II. and Becket. The latter had been Henry's chancellor, adviser, and close friend, and was appointed by him to the archbishopric of Canterbury on the death of Theobald. Becket was a man of unyielding will and fixity of purpose, and had warned the king that his appointment to that office would put him in the only place where he would be his opponent. So it turned out, for he immediately asserted to the full all the ecclesiastical claims, and aggressively acted upon them. These assertions caused minor conflicts with the king, and soon culminated in a contest over the question of jurisdiction of ecclesiastical offenders. A gross offence having been committed by a clerk, Henry demanded that he should be given up to the civil tribunals for trial and punishment after his degradation. This being refused on the ground that it was iniquitous to try a man twice for the same offence, Henry called an assembly of all the prelates and asked whether or not they would submit to the *ancient customs of the realm*. They unanimously replied that they would, *saving their own order*. The answer being clearly of no value to Henry, he called a general council (the name Parliament not yet having been appropriated to designate the legislative body), which accordingly met at Clarendon in 1164. By this body was passed the statute known as the "Constitutions of Clarendon." The barons in the assembly being all in favor of the king, the bishops were overawed (some writers say coerced), and also gave their consent. Not satisfied with their mere assent, Henry required that the bishops should also set their seals to the instrument; and this was accordingly done by all. Becket at first refused, but finally consented, after much urging by

some of his own party, who expressed the greatest fears as to what might otherwise happen to the Church.

The Constitutions thus enacted declared themselves to be the ancient customs of the realm, and were contained under sixteen heads, the most important of which were to the following effect: That in all civil and criminal causes the clergy should be subject to the king's courts, and should be tried therein; that in ecclesiastical questions appeals should lie from the archbishop to the king, and should be carried no further without the king's consent; that no archbishop, bishop, or other exalted person should leave the kingdom without the royal permission; that the revenues of vacant preferments should accrue to the king; that in elections for an archbishopric, bishopric, abbacy, or priory the king should recommend the best persons, the subsequent election be made with the king's consent, and the new dignitary should do homage to the king for his temporal rights. Many of these provisions were but a declaration of what was undoubtedly law—a good deal of it being founded, as already said, on the regulations of the Conqueror—but there seems to be no doubt that the provisions in regard to jurisdiction were new, and not founded, as they professed to be, on ancient custom. The pope's position being then weakened by the existence of an antipope, the king sent the Constitutions to him for his ratification, thinking that he had finally triumphed; but Alexander III. refused his assent to all the articles except six unimportant ones. Becket now expressed deep contrition for having given his assent, and was absolved therefrom by the pope. The hostility between Henry and the primate grew, and they endeavored in every most violent way to crush each other, until Becket, after two unsuccessful efforts, succeeded in escaping to France (1164), where he lived in great magnificence for some years at the convent of Pontigny. Becket was supported in the main by the pope, but the latter being then engaged in war with Frederick Barbarossa, and being opposed by an antipope whom Henry threatened to support, did not give his unqualified aid to Becket. During the latter's residence abroad Henry took the most violent measures against him and all that belonged to him in England, and Becket responded with equal violence from the Continent. At length, after several fruitless endeavors at reconciliation, one was effected, and Becket returned to England (1170), and was received in great triumph. But it was at once evident that the contest was still unsettled, and new difficulties soon arose. An entirely new face was put upon the matter, however, by the murder of Becket on Dec. 29, 1170, brought about by a hasty expression of the king in the presence of some courtiers. The whole Christian world heard the news with the utmost horror, and Henry had no course left but submission in order to escape far worse results. Becket's tomb was visited by multitudes of pilgrims; he was canonized and became a favorite saint; and Henry barely escaped excommunication. The cause of the contest had to be given up, and Henry at once renounced almost all he had claimed in the Constitutions of Clarendon, and so strenuously contended for. He later (1177) specifically promised that no clerk should be prosecuted in a secular court for any crime. Though Henry was thus obliged, temporarily at least, to give up so much of that which he had struggled for, the Constitutions were not formally repealed, and remained a part of the written law of the realm. While it is pretty sure that some of their provisions, especially that in regard to the filling of ecclesiastical benefices, were acted upon even by Henry himself, it seems clear that they were not regarded as fixing the law on all the subjects they touched. Apparently, many of their provisions came gradually to be the customary law of the realm, and to derive their force from this fact, rather than from their prior enactment; but many of them also were not acted upon, and some of them were at a much later period formally enacted as statutes.

(W. M. M.)

CLARET. See WINES.

CLARINDA, the county-seat of Page co., Iowa, is on the Nodaway River, 63 miles S. E. of Omaha, on the Chicago, Burlington, and Quincy Railroad, the Wabash, St. Louis, and Pacific Railway, the Denver Short-Line Railroad, and the Humeston and Shenandoah Railroad. It has four hotels, two banks, one daily and three weekly newspapers, six churches, and good public schools. It has two foundries, carriage- and plough-factories, and three flour-mills. It has well shaded streets and a park, and is free of debt. It was settled in 1852, and incorporated as a city in 1860. Population, 3259.

CLARK, ALVAN, an eminent optician and successful maker of optical instruments, especially of refracting telescopes of very large apertures, spectroscopes, chronographs, etc. His father, whose name was also Alvan, removed during the last decade of the last century from Cape Cod on the coast, and settled on a rough, stony farm at Ashfield, Franklin co., Mass., where, on March 8, 1804, the subject of this brief biographical sketch was born, being the fifth of ten children. As was generally the case in those days, his early education was neglected. In fact, all the schooling he ever received was obtained at the district school —then only an embryo of the public school of modern times—during the winter months, the larger part of the year being employed in assisting his father in farm-labors. Like most boys, the rod and gun, whose use in the then abounding streams and forests brought ample spoil, had greater attractions for him than had Webster's *Spelling-Book* and Daboll's *Arithmetic*, or than had the distasteful drudgery and routine of the farm. The bent of his mind was early shown to be for mechanics. Even while yet a little lad he had familiarized himself with the construction of the clocks, watches, and guns of his neighbors. He also took delight in studying hydraulics and hydrostatics at the grist- and saw-mills near by, for all of which a beautiful brook running through his father's farm supplied power. At the age of seventeen years he began to see clearly that there was no patrimony awaiting him, and that he must shift for himself; so, having saved a little money which he himself had earned, he procured some tools and materials, and without a teacher commenced at his father's house the practice of engraving and portrait-painting, which he followed until his twenty-second year, when he found employment at engraving for calico-printing at East Chelmsford (now the city of Lowell), at which he continued to serve for nine years, though part of the time in New York City. All the leisure he could command during this time he devoted to painting miniature portraits on ivory, and, having opportunity for studying choice specimens of the art, was enabled to attain such proficiency that greater remunerative prospects caused him to consider the advisability of altogether abandoning engraving. In 1835 he opened a studio in Boston, and a year later removed his family, consisting of a wife and four children, to a newly-purchased home in Cambridgeport.

where he still resides. The room selected for his studio he continued to occupy for twenty years, at which time photography struck a deathblow to his business, and his brilliant anticipations of success were suddenly ended.

The manner in which he became a telescope-maker may not be inappropriate to mention as another illustration of an entire change in the affairs of one's life by an apparently trivial circumstance. His eldest son, George B., at the age of seventeen happening to read an account of the process of casting and grinding specula for reflecting telescopes, had, unknown to his father, procured his metals and completed a casting for a five-inch speculum. Fortunately, his father not only encouraged him, but rendered him all the assistance in figuring and polishing of which he was capable; which, however, was but little, for he himself had never ground a speculum or a lens, nor had he ever witnessed the numerous and delicate processes resorted to by opticians to produce such an article; but being a firm believer in the adage that "Some things can be done as well as others," he procured an ill-corrected spy-glass, and in a rather desultory manner changed and rechanged the curves, and finally, after many trials, succeeded in freeing the object-lens from both spherical and chromatic aberrations. From this small beginning he has gone on increasing the size of his telescopes until he has achieved an aperture never thought possible by the great telescope-makers of Europe. From 1853 to 1863 he manufactured object-glasses of from 4 to 7½ inches in diameter, with which he discovered several new and difficult double stars. It was with a 4½-inch he discovered that the star 8 Sextantis was double. An account of it was sent to that veteran observer, Rev. W. R. Dawes of England, who, after verifying it, wrote and published an account of the surprising achievement, which secured for Mr. Clark from that country several orders for telescopes, and afforded him great pecuniary relief, which was then much needed. He sold Mr. Dawes two telescopes complete, besides three object-glasses, one of which was of 8 and another 8½-inch clear aperture. It was with this latter glass, upon the occasion of its personal delivery, and while visiting Mr. Dawes at his home in Haddenham, that Mr. Clark discovered that 99 Herculis was also double, though its duplicity had escaped the notice of all previous observers. In 1856 he discovered the *companion* of Mu Herculis to be double, thus making the star a triple instead of a double, and all three physically connected and revolving around each other. In an autograph letter to the writer Mr. Clark says: "I have lived to see it through more than half a revolution." Otto Struve pronounces this one of the most interesting binary, or rather ternary, systems in the heavens.

As soon as the new business looked prospectively successful, Mr. Clark associated with himself his two sons, George B. and Alvan G., who by this time were prepared to assist him, under the firm-name of "Alvan Clark & Sons," or "The Clarks," as they are often called.

A strong desire to do whatever he attempted in the best possible manner always continued one of his marked characteristics. His telescopes are scattered throughout every civilized country—a strong attestation to their optical excellence and mechanical perfection. Astronomy owes him much, not only for important discoveries and valuable inventions of new and labor-saving methods of grinding and polishing object-glasses, but also in the production of a size which hitherto had been thought unattainable. The difficulties surrounding every process in making large object-glasses, from the melting-pot to the perfect lens, can be appreciated only by those who have made the matter a special study.

Mr. Clark was a member of the Philosophical Society of Philadelphia, and Harvard College conferred upon him the honorary degree of A. M. Both he and his sons were members of the American Academy of Arts and Sciences. He died at Cambridge, Mass., August 19, 1887.

As an illustration of his peaceful disposition and honorable character he was never sued but once, and then settled the matter in dispute, so that it was not brought to trial. He, however, once brought suit against the collector of the port of Boston (his only aggressive legal affair), and in relating the incident he naively remarked, "I beat him."

The following is a list of some, though not all, of the large telescopes which the Clarks have made from 12-inch aperture and upward:

Imperial Observatory, Vienna, Austria	12 inch.
Prof. Henry Draper, private observatory, Dobbs' Ferry, N. Y.	12 "
Morrison Observatory, Glasgow, Mo.	12½ "
Lick Observatory, Mt. Hamilton, Cal.	12½ "
Washburn Observatory, Madison, Wis.	15½ "
Lewis Swift, Warner Observatory (private), Rochester, N. Y.	16 "
Dearborn Observatory, Chicago, Ill.	18½ "
Princeton College Observatory, Princeton, N. J.	23 "
Naval Observatory, Washington, D. C.	26 "
L. J. McCormick, for University of Virginia	26 "
Royal Observatory, Pulkova, Russia (object-glass only)	30 "
Lick Observatory, Mt. Hamilton, Cal.	36 "

A representative of the czar of Russia, in the person of the celebrated astronomer Otto Struve, in ordering the Pulkova glass, bound the Clarks to the following conditions—viz.: that it should in defining power equal the Washington telescope; that he (Struve) should decide what the ratio of focal length to its aperture should be, but that it should not be less than 13 nor greater than 20 to 1. The makers were not to deviate more than one-fortieth part from the focal length given. Struve is to decide which two rays shall be brought to the same focus, which, owing to the irrationality of the spectrum, cannot be done for them all. The amount to be paid for the object-glass alone is $32,000, and for a trial-tube in which to test its performance an additional $1000 is to be given.

The Clarks completed in 1887 their order from the Lick Observatory of California. The object-glass of this telescope is a yard in diameter—the largest ever made or contemplated. This huge instrument, with all its accessories, weighing about fourteen tons, has been mounted in the great dome of the Lick Observatory on one of the three peaks of Mt. Hamilton, 4256 feet above the Pacific Ocean, which is 40 miles distant. Here in a smaller dome of the same institution the 12½-inch also looks heavenward. For the object-glass in its cell alone, including the trial tube, the makers received $51,000. For further particulars see article TELESCOPES.

It was with the Chicago telescope that Mr. Alvan G. Clark discovered the hypothetical and long-looked-for companion to Sirius, for which he was awarded the Lalande prize by the French Academy of Sciences. With the Washington instrument Prof. Hall found the two satellites of Mars, in some respects the most unexpected and remarkable astronomical discovery of modern times. With one of these telescopes—of only six inches aperture—Mr. S. W. Burnham of Chicago has discovered nearly one thousand double stars never

before suspected of being duplex, some of them being among the closest and most difficult found in any catalogue of double stars. Many were less than ·25″ apart. This shows how almost absolutely perfect in figure and polish the four surfaces of the lenses of his instrument must be, and how delicately the aberrations are corrected and those of the secondary spectrum balanced. (L. S.)

CLARK, GEORGE ROGERS (1752–1818), an American Revolutionary general and Western pioneer, was born in Albemarle co., Va., Nov. 19, 1752. In his youth he was a land-surveyor, and in 1774 commanded a company of militia in Dunmore's war with the Indians. His adventurous spirit had led him to visit Kentucky in 1772, and for a short time in 1775 he commanded a force of armed settlers there. In the next year he returned to Kentucky, determined to make it his home, and soon called together an assembly of the people, which met at Harrodsburg June 6, 1776. By this meeting Clark and Gabriel Jones were elected members of the Virginia assembly, although it was uncertain whether the Kentucky colonists would be recognized as under the jurisdiction of that State. Though not admitted to the legislature, these delegates were received kindly by Gov. Patrick Henry, and secured the formation of the territory into Kentucky county, some provision also being made for its defence. The powder sent for this purpose was transferred to Pittsburg, and thence down the Ohio amid great perils from Indians on the banks of the river. The military posts at Detroit, Vincennes, and Kaskaskia, originally established by the French, but then belonging to the British, were constant sources of Indian hostilities. Major Clark in Dec., 1777, obtained authority and means from Virginia to attack the fort at Kaskaskia, and by skilful management succeeded in surprising and capturing it, July 4, 1778. He then proceeded to Vincennes, and having, by the aid of a Catholic priest, gained the favor of the inhabitants of the town, compelled the commander of the fort to surrender. Leaving but two men at the post, he pushed on to the Mississippi. While engaged in negotiations with the Indians, he learned in the following January that Gov. Hamilton of Detroit had retaken Vincennes and was preparing for further enterprises against the Americans. Forthwith Clark plunged into the wilderness with 175 men, and after suffering dreadful hardships from wet, cold, and hunger in the drowned lands of Illinois, reached Vincennes Feb. 23, 1779, and capturing it the next day, sent Hamilton a prisoner to Virginia. When Louisville was founded Clark made it his headquarters. In June, 1780, in retaliation for an invasion of Kentucky by 600 Canadians and Indians, he gathered a force of 1000 men and destroyed an Indian town in Ohio. In December he formed plans for capture of Detroit, and went to Richmond to ob- the approval of the Virginia authorities. While t[illegible] he took a command under Baron Steuben in de- [illegible]f the State against an invasion by a British force [illegible] Benedict Arnold. Clark was made brigadier- [illegible]al in March, 1781, but on account of the move- of Lord Cornwallis the aid necessary to carry out [illegible] against Detroit was not furnished. After the [illegible] [illegible]e Licks, in 1782, he gathered 1000 mounted [illegible]and marched against the Indian towns on the [illegible]and the Scioto. Five of these were destroyed, [illegible] no formidable body of Indians ever in- . In 1786 he took part in an unsuc- [illegible] against the Indians on the Wabash. [illegible] epted from Genet, the French minister to the United States, a commission as major-general in the French army to conduct an expedition against the Spanish possessions on the Mississippi. When Genet was recalled this commission was annulled. Gen. Clark lingered long in infirm health and poverty. He died at Locust Grove, near Louisville, Ky., Feb. 13, 1818.

CLARK, THOMAS MARCH, D.D., LL.D., an American bishop of the Protestant Episcopal Church, was born in Newburyport, Mass., July 4, 1812. He graduated at Yale College in 1831, studied divinity at Princeton, in 1835 became a Presbyterian licentiate. He had charge of the Old South Church, Boston, for a few months, and then he took orders in the Episcopal Church. He was rector of Grace Church, Boston 1836–43; of St. Andrew's Church, Philadelphia, 1843–47. He was afterward an assistant in Trinity Church, Boston, and then rector of Christ Church, Hartford, until December, 1854, when he was consecrated bishop of Rhode Island. In 1850 he received the degree of D. D. from Union College, N. Y., and in 1867 the degree of LL.D. from the University of Cambridge, England. Among his works are *Lectures on Formation of Character* (1852), *Early Discipline and Culture* (1852; republished as *The Dew of Youth*), *Primary Truths of Religion* (1869), *The Efficient Sunday-School Teacher*.

CLARKE, CHARLES COWDEN (1787–1877), an Englishman of letters, born Dec. 15, 1787, at Enfield, in Middlesex. His lectures on literary subjects were popular, and he was an intimate friend of Shelley, Keats, and Lamb. Among his works are *A Hundred Wonders* (1814), *Adam the Gardener* (1834), *Tales from Chaucer* (1833), *Riches of Chaucer* (1835), *Carmina Minima*, a collection of verses (1859), *Shakespeare Characters* (1863), *Molière Characters* (1865), and series of *Essays on the Comic Writers of England* (1871, in the *Gentlemen's Magazine*). He lived for many years at Genoa. He died March 13, 1877.—His wife, MARY VICTORIA COWDEN CLARKE, a daughter of Vincent Novello, the composer, was born in London June 22, 1809. Her intellectual powers were early developed, and she was an intimate friend of Charles and Mary Lamb and of the literary celebrities closely associated with them. She was married to Mr. Clarke in 1828. In 1846 she published her admirable *Concordance to Shakespeare*, the result of sixteen years of hard work. Among other works of hers are *The Adventures of Kit Bam* (1848), *The Girlhood of Shakespeare's Heroines* (1850), *The Iron Cousin*, a novel of merit (1854), *World-Noted Women* (1857), *A Rambling Story* (1874), and translations of Catel *On Harmony*, and of Cherubini's *Counterpoint and Fugue*. She also contributed largely to periodical literature, and with her husband's aid prepared an annotated edition of Shakespeare.

CLARKE, JAMES FREEMAN, D.D., a Unitarian clergyman, was born in Hanover, N. H., April 4, 1810. He was named for his grandfather, Rev. James Freeman, long the minister of King's Chapel, Boston, who led his congregation to adopt Unitarian views. He was educated at the Boston High School and Harvard College, graduating from the latter in 1829. He studied theology in the divinity school of Cambridge, and graduated in 1833. He then went to Louisville, Ky., where he preached for seven years, and after spending a year at Meadville, Pa., returned to Boston. Here, in 1841, he began a free Church movement against the prevailing tendency of his Uni-

tarian brethren, but with the hearty approval of Rev. Dr. Channing. The new organization, called "The Church of the Disciples," was formed "to learn and practise Christianity" in the simple faith that "Jesus is the Son of God," and continued under Dr. Clarke's charge until his death. It became one of the leading religious institutions of Boston, noted alike for the high character of its membership and its activity in all good works. The "Service Book of the Church of the Disciples" combines features of worship rarely found united, including responses on the part of the congregation, extemporaneous and silent prayer. In like manner Dr. Clarke combined in his teaching firm belief in the supernatural with attention to the currents of public thought and the practical needs of every-day life.

While at Louisville he edited for three years *The Western Magazine*, and he continued for many years to contribute to newspapers and magazines, discussing with marked ability the social and political as well as the religious questions of the time. He was occasionally a delegate to political conventions, and in 1873 his defence of the right of "bolting" when unsuitable nominations were made attracted the attention of the nation. His influence extended far beyond the bounds of his Church or party, tending to promote sincerity, courage, devotion to principle, and the highest moral and spiritual aims. He died June 8, 1888.

His published works are numerous, the earliest being a translation of De Wette's *Theodore; or, The Sceptic's Conversion* (1841). In vindication of Gen. William Hull he published *A History of the Campaign of* 1812 (1848). In company with R. W. Emerson and W. H. Channing he prepared *Memoirs of Margaret Fuller Ossoli* (1852). Among his works treating of religious subjects are *The Christian Doctrine of Forgiveness of Sin* (1852), *The Christian Doctrine of Prayer* (1854), *The Hour which Cometh* (1862), *Orthodoxy: Its Truths and Errors* (1866), *Steps of Belief; or, Rational Christianity maintained against Atheism* (1870), *Common Sense in Religion* (1873), *Go up Higher; or, Religion in Common Life* (1878). His work called *Ten Great Religions* (1870) is a valuable contribution to comparative theology, intended to show the place, use and true worth of these systems of belief and practice and their relation to human progress. Part Second of this work, published in 1883, is called *A Comparison of all Religions*. Another notable work is *The Legend of Thomas Didymus, the Jewish Sceptic* (1881), in which Dr. Clarke attempted to set forth in a narrative the opinions, beliefs, and prejudices of the Jewish sects in the time of Jesus and the characters which surrounded him. Dr. Clarke published a volume of *Memorial and Biographical Sketches* (1878), *Self-Culture* (1880), *The Ideas of the Apostle Paul Translated into their Modern Equivalents* (1884), *Everyday Religion* (1886), *Vexed Questions* (1886), etc. His writings on every subject were clear, earnest, and inspiring.

CLARKE, JOHN SLEEPER, an American comedian, was born in Baltimore, Md., in 1835. At an early age he lost his father and was thrown upon his own resources. While still a boy he developed a strong inclination for the stage and became a member of a company of amateur tragedians, of which Edwin Booth, who subsequently became his brother-in-law, was also a member. By the desire of his mother he took up the study of law, reading industriously for about a year in the office of Elisha R. Sprague, in Baltimore, Md. But after a brave effort to meet his mother's wishes, he abandoned law and turned his attention earnestly to the stage. Although tragedy had attracted his boyish fancy, it soon became evident that low comedy offered the most inviting field for the exercise of his peculiar powers. Not wanting in pathos, and, indeed, having a nature singularly alive to emotional influences, he yet possessed that keen sense of the ludicrous, conjoined with an extraordinary mimetic faculty, which fitted him for comic activity. His first regular engagement began at the Old Chestnut Street Theatre, in Philadelphia, Aug. 28, 1852, the play being "She Would and She Would Not," in which Clarke assumed the *rôle* of Soto. He rose in favor, and in January, 1853, became leading man in the Chestnut Street stock company—a position which he held for a year. In 1854 he went to Baltimore, taking the place of first low comedian at the Front Street Theatre in that city. He became so general a favorite that the Baltimoreans forced upon him a complimentary benefit in the autumn of 1854, which became, indeed, a popular ovation. In August, 1855, he returned to Philadelphia, and took the position of leading comedian at the Arch Street Theatre until 1858, when he entered into partnership with William Wheatley and became joint-lessee of that house. The business was successfully conducted until 1861, when the partnership was dissolved, and Clarke arranged to appear as a star in New York. He made his *début* in this capacity at the Winter Garden and secured an instant and unequivocal success.

The critics with one accord hailed him as a great artist and the legitimate successor of W. E. Burton, whose loss had been felt as nearly irreparable. Clarke's fame was now secure, and he began a starring-tour of the principal American cities, rapidly acquiring fortune. He became part-proprietor of the three leading theatres of the country, the Boston Theatre, the New York Winter Garden, and the Walnut Street Theatre, Philadelphia, from each of which he reaped large financial returns. In 1868, Clarke went to England, making his appearance at the St. James's Theatre in the autumn of that year. London received him with an enthusiasm equal to that accorded him by New York, and, with the exception of a brief visit to his native country in 1881, he has since made England his home. He has played at nearly all the leading English theatres.

Mr. Clarke married a sister of Edwin Booth, and has always been noted for his strong domestic attachments and exemplary personal character. As an artist he may be said to have created a school of his own, although he approaches in his methods more nearly to the late William E. Burton than to any other actor. He has been called the pupil and follower of Joseph Jefferson, but is more pronounced in his action than Jefferson, and hence more purely a low comedian than that artist. Clarke's repertoire covers a wide range of character, his most noted impersonations being Toodles, Pangloss, Waddilove, and Major de Boots.

(F. H. W.)

CLARKSBURG, the county-seat of Harrison co., W. Va., is on the west fork of the Monongahela River and on the Parkersburg branch of the Baltimore and Ohio Railroad, 122 miles S. of Wheeling and 82 miles E. of Parkersburg. It has a court-house, six churches, a female college, two weekly newspapers, a national

bank, one other bank, two foundries and machine-shops, a woollen-mill, two flour-mills, and gas-works. There are coal-mines in the vicinity. Population, 2307.

CLARKSVILLE, the county-seat of Montgomery co., Tenn., is on the N. bank of the Cumberland River, at the mouth of Red River, 60 miles below Nashville. It is on the Louisville and Memphis Railroad, which here crosses both rivers. The city has a fine court-house, a hotel, two national banks and two other banks, one semi-weekly and two weekly newspapers, thirteen churches, and six schools. The South-western University (Presbyterian) was established here in 1874, the citizens contributing liberally for its endowment. There is also a female academy. The industries comprise a foundry, several flour- and planing-mills, and manufactures of ploughs, wagons, carriages, and ice. The city was incorporated in 1830, and, though it suffered severely by a fire in 1878, has revived and presents a fine appearance. It is lighted with gas, and supplied with water by public waterworks. The surrounding country furnishes a large amount of tobacco and other products for shipment by river or by rail. Population, chiefly of American birth, 4528.

CLAUSEN, HENRIK NICOLAI (1793–1877), a Danish theologian, was born April 22, 1793, in Marebo, where his father was pastor. The father, who was a man of ability, became afterward chief preacher in the Lady church at Copenhagen, and published several volumes of sermons. The son distinguished himself at the University of Copenhagen, and after graduating, in 1818, travelled extensively in France, Italy, and Germany. While in Berlin he came under the influence of Schleiermacher. In 1821 he began to lecture on theology at Copenhagen, and in the next year was made professor in the university there. He soon took part in the agitation for a constitutional government, and in 1840 he became a member of the provincial assembly at Roestilde, of which from 1842 to 1846 he was president. He was afterward elected to a constitutional assembly, and from 1848 to 1851 was a member of the state council. In 1876 he resigned his professorship, and he died at Copenhagen March 28, 1877. His reputation as a writer was first established by his *Catholicism and Protestantism in their Ecclesiastical Organization, Doctrine, and Ritual* (1825). This work involved the author in a famous controversy with Bishop Grundtvig, one of the results of which was a libel suit against the latter. Clausen published several other works against Grundtvig and his followers. He was also the author of numerous exegetical and dogmatic works. Among these are treatises on the *Synoptical Gospels* (1847–50), on *John* (1855), on *Romans* (1863). After his death a volume of autobiography was published.

CLAUSIUS, RUDOLF JULIUS EMANUEL, a German physicist, was born at Köslin, Pomerania, Jan. 2, 1822. He studied at the University of Berlin, and became a *privat docent* there, as well as professor of physics in a military school. In 1855 a polytechnic school was established at Zurich, and Clausius was appointed to the chair of physics. He also obtained a professorship in the University of Zurich. In 1867 he became professor at Würzburg, and two years later at Bonn, where he died, August 24, 1888. Besides inv[illegible] in optics and on the elasticity of [illegible] Clausius's labors have been chiefly [illegible] of heat, which he maintains to [illegible] in motion. His essays on this subject appeared first in Poggendorff's *Annalen*, but he afterwards published separate treatises—*Ueber das Wesen der Wärme* (Zurich, 1857), *Die Mechanische Wärmetheorie* (Brunswick, 1864; 2d ed. 1876), *Ueber den zweiten Hauptsatz der mechanischen Wärmetheorie* (Brunswick, 1867). His work *Die Potentialfunktion und das Potential*, first published at Leipsic in 1850, reached its third edition in 1877.

CLAVICLE (Lat. *clavis*, a key, *clavicula*, a small key), the collar-bone. In man this bone is rather slender for its length, curved somewhat like an italic *f*, and extends from the acromion process of the scapula to the manubrium of the sternum; it is movably articulated at each end, and the sternal end furnishes the only bony connection of the arm with the trunk proper of the body. From its exposed situation in the neck the collar-bone is peculiarly liable to fracture. In nearly all Mammalia the clavicles, when perfect, repeat the same connections they have in man, but they are frequently defective or wanting altogether. They are consequently of little value in morphological classification, being present and perfect, or in varying imperfection, or absent, in closely-related animals, even of neighboring genera. They are best developed, as a rule, in those quadrupeds which use the fore limbs as arms and hands, rudimentary or lacking in those which the same limbs are exclusively devoted to ordinary locomotion. In birds the clavicles are usually present and perfect, but very seldom join the sternum, being united with each other on the middle line of the body to form the furculum or merrythought, usually developing at their junction a special process called the *hypocleidium*. They are absent or rudimentary or separate in *Ratitæ* and some parrots; ankylosed with the keel of the sternum in some *Steganopodes*, as the pelican and frigatebird; with the body of the sternum in *Opisthocomus*. When perfected they serve to bear the shoulders apart; and their degree of curvature and solidity bear some relation to power of strong or protracted flight. (E. C.)

CLAY, in its purest state, is a mineral substance of perfect snow-white color; it feels to the touch like soap, is very soft and brittle; it sticks to the tongue, and emits a peculiar odor when the moist breath is blown upon it. Kneaded together with water, it absorbs the latter in considerable quantity, and passes into a peculiar condition which is designated *plastic*. In this state the clay has lost its brittleness, the particles adhere with considerable force and yet possess a remarkable freedom of motion against each other, and may thus receive any arbitrary shape from the moulding hand of man. This is a quality not possessed by any other mineral substance, and gives to clay its great importance as raw material in the arts. Clay, however, is not a uniform mineral matter.

The above characters belong only to one of its composing parts, which may be named the *clay-substance*, or, in conformity with mineral nomenclature, *kaolin*. Kaolin is made up of minute loosely-aggreated particles invisible to the naked eye and impalpable to the touch—that is, without grit. Under a magnifying power of 1100 diameters these particles look like globules, and in appearance their aggregate is not unlike to fish-roe. The writer's observations harmonize in this respect entirely with Aron's, who examined them under a power of 760 diameters. They differ from those of other observers, who conclude that the clay-substance is composed of fragments of crystal. The writer could not observe any effect which this material is said by some to have on polarized light.

which would be a proof of their crystalline nature. This substance, on the contrary, resembles much more the globules of starch, being capable of absorbing water, of swelling, and of passing into a plastic paste. The extreme mobility of the particles is accounted for if they possess a spherical instead of an angular form, and we state it as the result of numerous examinations that the ultimate particles of the clay-substance proper are of spherical shape. Being so very small—that is, less than the $\frac{1}{10000}$ part of an inch, a diameter for which the ratio of surface to mass is very large—it follows that this substance can remain suspended in water for a long time. The peculiar milky opalescence which river-water shows many days after the subsidence of a freshet is owing to the suspension in it of these minutest clay-globules.

The other components of clay are best designated *in common* as *sand*. They are fragments of different mineral species—quartz, felspar, mica chiefly, tourmaline, hornblende, magnetite, ilmenite or titaniferous iron, rutile, and others. These minerals are hard, their fragments angular and of all degrees of fineness. They may be reduced to grains not much larger than the globules of the clay-substance and remain suspended with them in water, whilst the sand proper settles very quickly, and may be thus separated from the kaolin. The mineral nature and chemical composition of the sandy portions of a clay and their relative quantity determines whether a given clay is serviceable for a specified purpose. Besides the sand, there are other compounds present in clays, such as coaly matter, the red, brown, and yellow oxides of iron, pyrite, fossil rosin, bitumen, black oxide of manganese, alum, gypsum, calcite, dolomite. They produce the many colored varieties of clay, and are either quite harmless or more or less hurtful to the uses to which clay may be put.

According to their place of occurrence, clays are divided into those of *primary* and *secondary* deposits. According to structure, physical condition, and comparison, clays are said to be *fat*, *lean*, *plastic*, *argyllites*, *clay-slates*, *marls*, and *loams*. To gain a proper idea of these differences we must consider the—

Origin of Clay.—The so-called primitive rocks, which have been proven by all deep mining and by the study of the sequence of rocks to underlie all other rocks, are composed chiefly of three species of minerals, quartz, felspar, and mica. Quartz is pure silica (SiO_2), very hard, compact, and very indifferent toward chemical agencies at ordinary temperature. Felspar is a more complex compound, containing at least four elements—*i.e.* potassium (K), aluminum (Al), silicon (Si), and oxygen (O). These elements are combined in the ratio $K_2Al_2Si_6O_{16}$. Potassium may be replaced by sodium wholly or in part, and also by calcium, in felspar. It is a white, vitreous, easily-cleavable substance only one degree less hard than quartz. Mica is composed of the same elements, with the addition of iron and magnesium. But the ratio of combination is different, likewise, for the several species of mica: muscovite, the white mica; biotite, the dark-colored mica. The micas crystallize in the same system with the felspar, but possess only one eminent cleavage. The cleavage laminæ are flexible, elastic, and much softer than felspar. The same or very similar minerals form the component parts of a number of igneous or volcanic rocks. When these minerals are aggregated in more or less parallel layers, they form *gneiss*, whose structure is schistose or slaty: when in granular, irregular aggregation, they form *granite;* when developed with porphyric structure, they compose the volcanic rocks *porphyry* and *trachyte*. The researches in chemical geology have proved that all other rocks have been formed by the chemical and mechanical destruction of those just mentioned. It is not asserted by the writer that they are *original* rocks; they are merely the oldest and deepest we have any cognizance of. At all places where the felspathic rocks have been at the surface for any length of time a peculiar change becomes noticeable. Especially the coarse-grained granite, in which the felspar is found very pure, and often in large masses, shows this change more markedly. The glassy surface of the mineral turns to a pulverulent chalk-like substance, and this is due to its conversion into the clay-substance, or kaolin. In chemistry the law prevails that the more complex a composition a given compound possesses, the more ready it is to succumb to the action of chemical agencies. Likewise, the more a ternary compound or salt is acid—that is, the more the ratio of that acid portion increases over that of normal saturation—the less will be its chemical stability. In the felspar we have a case exactly corresponding. The composition of the *orthoclase* felspar has been stated as $K_2Al_2Si_6O_{16}$. This formula may be written $K_2O+Al_2O_3+6SiO_2$.

Under the action of water, which penetrates into the smallest cracks and by its freezing in wintertime expanding with irresistible force, the most compact minerals are finally broken and ground into the finest powder. After this physical disintegration the chemical action begins. Many writers of high authority ascribe the principal *rôle* in this action to the carbonic dioxide contained in the air to the amount of 0.03 of one per cent. They believe that a body of acid chemical nature is indispensable in the decomposition of mineral compounds, and this fractional percentage of carbonic dioxide is the only available body of this kind. The writer does not share in this belief. The observation in the laboratory that pure water (obtained by distillation) alone will slowly decompose—*i. e.* destroy and rearrange the molecules of a substance like hard Bohemian glass if the latter be very finely pulverized—seems entirely sufficient to account for the decomposition in nature of a body like felspar by water alone. Water acts in the capacity of an acid as well as a base, and the strongest affinity undoubtedly exists to exert this capacity, especially toward supersilicated minerals like felspar. In this case the attack by water is supported by the possibility of forming a compound soluble in water—potassium silicate; for if the white pulverulent substance forming from the felspar be examined, it is seen that only fractions of one per cent. of K_2O are left, whilst the fresh felspar contains sixteen per cent. The result of the completed decomposition may be represented by an equation: $K_2Al_2Si_6O_{16}+H_2O=Al_2Si_2O_7,2H_2O$ (kaolin or pure clay-substance) $+K_2Si_2O_7,3H_2O+SiO_2,2H_2O$: of these three products, the first and last are soluble in wa[illegible]; middle one is soluble in it. [illegible] be separated from the clay [illegible] a dilute solution of sodium [illegible]onate. [illegible] proper to take the hydrates of [illegible] or because they will decompose and [illegible] substance also.) The above fo[illegible] body, $Al_2Si_2O_7+2H_2O$, gi[illegible] sition: silica (SiO_2), 46.40. [illegible] water (H_2O), 13.92 (Ram[illegible]

2d edit., 642). But this formula is not generally accepted. C. Bischof, in his excellent treatise on *The Refractory Clays* (Leipzig, 1876), assumes a more basic silicate: Al_2O_3,SiO_2+2H_2O or $2Al_2O_3,3SiO_2+4H_2O$ (when silica = SiO_2). This yields the percentage composition: silica, 39.33; alumina, 44.93; water, 15.73. The percentages of alumina and silica are very nearly reversed in the two formulas. Bischof follows Malagutti, who treated the kaolin with potassic hydrate and then analyzed the residue. But this method is incorrect, as stated above. There are, however, certain very refractory clays whose analysis leads nearly to Bischof's formula; they are exceptions, and it must be assumed that they contain aluminic hydrate mixed with the silicate. The whole subject, however, is by no means clear. Investigations of a still more critical character and more comprehensive than those on record might possibly shed a better light upon the true composition of this highly useful mineral.

Such, then, is the process of the hydration and kaolinization of the felspathic rocks. It is plain that the bulk of the insoluble residue cannot be pure kaolin, but must be a mixture of this with grains of fresh or partly altered felspar, quartz, and the fragments of all other and less easily decomposable minerals of the original rock. It will be understood that this residue as a whole is therefore a *rock*—*i. e.* an aggregate of minerals—and not a species of *mineral*—that is, a uniform and homogeneous substance. Among the minerals in the granite and gneiss are black tourmaline, black hornblende, and black mica, or biotite. These are silicates containing ferrous oxide (protoxide of iron). Undergoing the process of hydration like the felspar, this iron becomes altered into ferric hydrate or brown hydrated sesquioxide of iron—iron-rust; sometimes, also, into the red oxide. This imparts to the kaolin its color and produces all shades, from the faintest buff to a deep-brown color. Owing to this cause, few localities furnish a pure white kaolin, which alone is desirable in the arts, and commands a ready sale.

The word *kaolin* is accepted as the Chinese term for designating an earth serviceable in the manufacture of porcelain. In England and this country the word *China-clay* is mostly used to designate a deposit of kaolin which is still *in situ*—that is, above or between the granite or gneissic rocks from whose decomposition it was derived. One of the most notable deposits of this kind is that of St. Austel in Cornwall, where it has been mined for many years in a huge open quarry along the tops of a long hill. In Delaware and Chester counties, Pa., in the neighborhood of Wilmington, Delaware, and around Baltimore, Md., are examples in this country. Neither of these compares in extent with that of St. Austel. All these deposits may be looked at as products of the present geological periods, during which the rocks have been exposed to atmospheric agencies. Their bulk is constantly decreasing, under the washing energy of rains and floods. Suspended in the current, both kaolin and mineral fragments are carried into the rivers. As soon as the carrying-power of the current decreases by reason of lessened velocity the heavier sandy materials fall out, mostly along the banks of the rivers, if they have risen above those banks, whilst at a distance, on the so-called *flood-plain*, the velocity decreases apace, and m and more the finer grains fall out, until at last, r quiet water—that is, in the bays and estua- the counter-current of the tide checks the —the deposition of the clay-particles takes with the very finest sand. These are the mud-bars at the mouth of very large rivers. As the dredgings show, they are composed of clay, not of sand. Instead of emptying into the sea, the waters may empty into a large lake or fresh-water basin, or into huge swamps. At all events, these are Nature's settling-vats. And thus we account for the numerous clay-strata which are encountered in all geological formations, from the earliest palæozoic to the most recent tertiary and quaternary. These deposits are *clays*, in the more restricted sense of the word. They occur mostly in beds of varying thickness as well as purity, which follow the stratification in *dips* and *strike* of the surrounding rocks, sandstones, limestones, etc. Containing the kaolinized product of the entire geologic time, their magnitude in superficial extension is very great. But there can be no doubt that many of the late clay-formations are made by redepositing the material of one or more older deposits, through which stretches the drainage of a river-system. According to collateral circumstances, the repeated transportation and deposition of clays may result in a purification or in a degeneration; the probability is in favor of the latter. The structure and general physical condition of these transported, or *secondary*, clays is very varying, as well as their ultimate chemical composition. All have preserved the one common stamp of their origin—that is, a decided bedding or separation in layers, each of which undoubtedly corresponds to one flood. But pressure and the influence of surrounding or penetrating volcanic rocks has largely modified the original bedding. In the older clays these layers are so much compressed and hardened that they form *slates*. The well-known black roofing-slates of the Blue Mountain, belonging to No. 3, or Hudson River, group-formation, are simply highly compressed and hardened clay. This slate, when finely ground and in contact with water, returns after a time into plastic clay. Between this hard slate and the soft clays of tertiary or quaternary age we find all degrees of slaty structure. The whole of these are comprehended under the generic term "argillites." They are *clay-slates* at the one extreme end, and *slaty clays* at the other. It is well known that the outcrops of roofing-slate beds are too rotten for serviceable material. The slate must be gotten by underground mining at a considerable depth. Being exposed to rain and frost, the slate absorbs water along the outcrops, swells, and becomes a lean clay.

Properties of Clay.—Under this head we shall speak of the qualities of the clay as a rock-mass—not so much of the clay-substance as of the various modifications which the properties of that substance are subject to by the admixture of the sandy fragments. As such, we mean the fragments of all possible minerals. In absolute quantities the quarts always predominates in the sandy part.

Physical properties are such as may be at once noticed by the eye—color and lustre; opaqueness or horny translucency; touch, sectility; the dimensions of the granular admixtures; the presence or absence of efflorescences, of concretions; the fracture and general structure. Other physical properties, or at least their causes, are not at once observable. Among them the most prominent and important is the *plasticity*, in whose train many other phenomena may be considered—the shrinkage; the binding capacity, the cohesion; the fatness or leanness; the capacity for absorbing water—capillarity or porousness; the stiffness or resistance against water, etc.

Plasticity is the most valuable property of clay. It

means the power to pass with water into a dough which may be moulded into any convenient and desirable shape. This power decreases with the percentage of increase of the sandy admixtures. It is strongest in the *fat* and weakest in the *lean* clays. A clay may be, however, too plastic; it dries very slowly and unevenly. Objects after moulding will warp and crack. Lean clays absorb water readily and become plastic; fat clays rather resist the water. Many of the latter class show the peculiarity which may be called *water-tightness*—that is, they will not take up any more water after a certain quantity has been absorbed. Such clays are used with advantage in the construction of temporary dams and weirs, in making a shaft water-tight when sinking through loose or swimming rock. When first taken from the deposits near the surface, the clays are mostly in this condition of water-saturation.

Experimenting upon the purest clay-substance obtained by careful washing in Schöne's apparatus, Dr. Jul. Aron found that the linear shrinking does not progress apace with the drying of the clay, as might have been expected, but only follows up to a certain point, which he calls "limit of shrinkage;" the water evaporated to this point is "the water of shrinkage;" the remainder of the water given out until the weight of the sample remains constant at a temperature of 130° C. as the "water of pores." The sum of both is the total water. Under the supposition that the smallest material particles of clay-substance possess globular shape, this behavior is explicable. In a measure, as the water which separates those particles passes off, these will approach until they touch each other. But each particle will be touched only at six points of its surface, and therefore the interstices between all the other points will still be filled with the water of the "pores;" its evaporation cannot produce any further shrinkage of the clay. It follows as an important rule for the potter that *the number and size of the pores is independent of the water contained in the clay and is constant for all plastic clays;* and, further, that *the cubical shrinkage is equal to the volume of water lost by evaporation up to the limit of linear shrinkage.* Aron found further that if the purest clay-substance is mixed with very fine quartz sand the shrinkage will increase up to a certain point, which he calls the point of "greatest density." From this point the shrinkage decreases again, with increasing leanness, while the porousness increases.

Exposure to red heat destroys the plasticity of clay, because the two molecules of water are eliminated from the aluminum silicate at that temperature, and as a consequence the clay shrinks a second time; that is the "fire-shrinkage." Addition of quartz sand neutralizes this second shrinking, and even reverts it into expansion. Aron found that a clay-mass made lean with quartz sand shows a larger volume at a red heat than it had shown in the air-dry state, and that from a given point of leanness the volume will grow inversely as the temperature. Finely pulverized pure limestone is an excellent means to counteract the fire-shrinkage, since it imparts to the burnt mass a certain uniformity in expansion and porousness within temperatures of considerable range. If the temperature be carried to a white heat, these facts suffer a modification, because new chemical affinities are provoked; the materials of a clay-mass lose their former identity more or less completely. This leads to the consideration of the most important physical property of pure clay-substance and of clay, *its resistance to the action of very intense heat.*

The two proximate components are alumina (Al_2O_3) and silica (SiO_2). Both are found in a very pure state as crystallized minerals, the first as corundum, and with water as diaspore ($Al_2H_2O_4$); the second as quartz, hornstone, chalcedony, flint, and opal. Exposed to highest temperature which can be realized in furnaces, at which pure platinum fuses, neither corundum nor diaspore shows the least change or tendency to fusion. Artificially-prepared alumina purified to the utmost behaves in the same way. Exposed to the same heat, quartz (as rock-crystal) becomes rounded at the sharp edges and corners, while its whole surface appears covered with a lustrous glaze. This mineral is therefore less refractory than corundum. The other varieties mentioned are always more or less impure from admixture of other bodies. They are decidedly more fusible than the pure rock-crystal. The glazing takes place at the temperature of melting wrought iron, and some varieties even fuse to a transparent or milky glass.

There is a general law that if two bodies enter into chemical combination the resulting compound will have a lower fusing-point than the arithmetical mean of their individual fusing-points. The combination of silica and alumina is no exception to this. Its fusing-point is lower than that of quartz; it glazes readily as it approaches melting heat of wrought iron. It remains to be seen now how the relative proportions of the two compounds affect the fusing-point. The concordant results of extended experiments by C. Bischof and Richters show that the refractory character increases with the preponderance of alumina. Up to a certain point the addition of silica increases the fusibility (about 1 : 6); beyond this point it decreases again toward the same as in the ratio 1 : 1.

The natural clays are rarely or never pure $Al_2O_3 2SiO_2+2H_2O$. As explained above, they contain fragments of a number of other minerals with varying composition, but generally silicates, and carbonates of the metals iron, calcium, magnesium, and manganese; more rarely sulphates of calcium, magnesium, iron, and aluminum; phosphates of calcium and aluminum, chloride of sodium, oxides like those of iron, as hematite (Fe_2O_3), limonite ($Fe_4H_6O_6$), ilmenite or titaniferous iron ($Fe_2O_3+TiO_2$), magnetite (Fe_3O_4), rutile (TiO_2); sulphides, as pyrite (FeS_2); rarely galenite (PbS) and blende (ZnS). Materials of organic origin are, seldom wanting in clays. They are hydrocarbons (bitumen), sometimes in such quantities that they impart a very peculiar and disagreeable odor when the clay is rubbed (stinking clays). They are oxidized hydrocarbons, such as humic acid. Graphite and amorphous carbon are very often present in clays. All these materials have little influence on the fusing-point as they are destroyed in the furnace, except graphite, which rather raises the fusing-point. The potassium which is always present in clays is contained in the fragments of orthoclase. These substances more or less modify the refractory character of kaolin and secondary clays; they lower the fusing-points, and are most properly comprised under one term as "fluxing agents."

Richters mixed one part by weight of pure alumina with two parts of silica, and exposed the mixture for considerable time to the highest heat attainable in the furnace until a partial fusion took place, showing that the two bodies had formed a chemical union. The product was again pulverized, and equal portions of

ntimately mixed with four per cent. of the
xides, one part with percentage of magnesia,
oxide of calcium (lime), one with ferric oxide,
with pot n oxide (potassa). When the
1 o into small cylinders, were ex-
hig heat, the experimenter
. A) had completely
w V (., o, and 4 followed, so
1 z (oum potassa) had been least
the order o. hese samples corresponds
w weights of these oxides in ascending
O = 40; CaO = 56; $\frac{1}{2}(Fe_2O_3) = 80$; K_2O =
formulates this result as a law, thus:
ities of different fluxing oxides pro-
t upon the fusibility of a clay. For
f analysis had shown that a certain clay contains magnesia = 0.3 per cent., and that another clay contains potassa = 0.70, we could deduce with certainty that both would stand equally in the fire, all other conditions being the same. According to the same observer, the presence of several fluxing oxides in a clay does not influence the effect produced by each singly; the fusibility increases only with the higher sum of their equivalent weight. As the manufacture of fire-resisting bricks and vessels of many descriptions forms the foremost use of clays, the properties of clays just described are practically the most important.

The following table is taken from C. Bischof's work (*l. c.*). It gives the composition of seven clays which he takes as types of seven classes as far as refractoriness and plasticity are concerned:

	I.	II.	III.	IV.	V.	VI.	VII.
)	36.30	38.54	34.78	36.00	35.05	27.97	28.05
combined	38.94 } 43.84 4.90 }	40.53 } 45.68 5.15 }	39.69 } 49.64 9.95 }	41.00 } 47.74 6.74 }	39.32 } 47.33 8.00 }	33.59 } 57.49 24.40 }	30.71 } 58.32 27.61 }
h	0.19	0.38	0.41	0.33	1.11	0.54	0.75
	0.19	0.08	0.68	0.40	0.16	0.97	0.72
)	0.46	0.90	1.80	2.57	2.30	2.01	1.89
Ol	0.42	0.66	0.41	1.05	3.18	0.53	1.39
n	17.78	13.00	12.00	11.81	10.51	9.43	8.66
	99.18	99.24	99.72	99.90	99.64	99.44	99.78
) stavings	100	70–50	50	45	30	20	10
L	1–2	3	10–11	9–10	8	9	8–9
ry							
water	3.26	8.90	10.73	10.46	7.43	6.88	6.56

I. *Clay from Saarau, in Upper Silesia.*—made with carefully selected pieces from dweights of clay from this locality. They material of deep-blue color, not looks somewhat hornlike, is of very mild grain, and shows no admixtures to e clays belonging to this type are very po are reduced to a minimum (abthree cent. of water), and are *not* bec slightly plastic when soaking in ength of time. The clays of the o this class more than others—celebrated prime-quality clay from Garn-Gartsherie, in Scotland. The New Jersey of the cretaceous formation include a few rnishing a quality very little inferior to this 1. The celebrated Stourbridge clay is notably This prime quality is only used for glass-rucibles, and the best grade of fire-brick.

Kaolin from Zettlitz, near Carlsbad, in .—This material is found in the highly felsanite. It is a china-clay, and does not come t in its crude form. It is first subjected to a process. The crude kaolin is grayish-white; ugh and gritty between the fingers. The reterial, when dry, forms very uniform pieces nchoidal fracture. It shows mild touch and t soapy; it cuts smoothly, and the cut surface When heated, it turns black at first (from or admixtures); but soon the fine carbon burns, lmost snow-white. This china-clay is used ely in the manufacture of porcelain (on white color). Of similar grade are some -clays of Delaware and Pennsylvania, and n of St. Austel, in Cornwall.

ian Clays.—These clays are basins in the limestone for- ue coal-measures in the prov- ince of Namur. There are several belts of such basins. The best quality is furnished by the second belt, touching the villages of Wez, Moget, Coutisse. The clay has a blue or black-blue slate-color and is remarkable for its binding power—that is, the large amount of sand that it will take up without losing its plastic force. It has a very soap-like touch and assumes a vivid lustre on the face of a cut, almost like graphite. Placed in water, it falls to small pieces, while large numbers of air-bubbles escape with a hissing sound. Rubbed in the mortar, it shows grit (one per cent. of small quartz-grains). This clay is mined by shafts (140 feet) and underground workings.

CLASS IV. *Clay from Mühlheim, near Coblenz, on the Rhine.*—It lies at the bottom of the brown-coal or lignite formation, and is mined by means of so-called "hoop-shafts." They are sunk from 30 to 80 feet, and pass through a layer of pumice-sand before reaching the clay. In all physical properties it is like the Belgian clay, except that the degree of fusibility is lower.

CLASS V. *Clay from Grünstadt, in the Palatinate.*—Occurs in nests in the tertiary limestone, probably derived from the decomposition of porphyry, which constitutes the Donnersberg Mountain, some miles distant, the kaolin being carried thence by floods. It is of light-bluish color, is free from grit, and otherwise is like the two preceding clays. After burning has a yellowish- and grayish-white color.

CLASS VI. *From Oberkauffungen, near Cassel, in Prussia.*—This and the next class are characteristic representatives of clay-beds from the brown coal, lying either above or below a coal-bed. Clay VI. in the air-dry state has a bluish-gray color, shows remnants of coal-plants and patches of coal, contains pyrite, cuts smoothly, and is quite plastic.

CLASS VII. *Clay from Niederpleis, on the Sieg, in Nassau.*—It has a greenish-gray color and a mild,

soapy touch, falls to pieces in water without hissing, quite plastic, turns black when heated, and finally takes a light-yellow color.

All these classes represent *refractory* or fire-clays, but those of the first-class are ten times as refractory as those of the seventh class.

The United States are well supplied with clays of all grades and descriptions, eminently fitted for the finest pottery and the most refractory brick. The most developed among these are the beds occupying a belt, five miles wide, stretching across the State of New Jersey from Trenton north-east to Perth Amboy. The best deposits are around the latter town, especially near the village of Woodbridge. This belt is bounded on the north-west by the New Red Sandstone, and to the south-east by the greensand marl. The few fossil plants found in the clay, together with the dip of the beds, indicate the geological position of lower cretaceous of this country, but upper cretaceous of Europe. The beds lie above the red sandstone, but no pebbles of these rocks are found in them. The pebbles found contain fossils which belong to the upper Silurian and lower Devonian and point to a large land-surface, whence the clays where washed to their present place—a land-surface to the south-east which lies now beneath the Atlantic. A section near Woodbridge shows the thickness of the entire clay-formation to be 347 feet. Of this, however, only 165 feet are good workable clays; the rest are sands and sandy clays. The dip, being very slight—only 60 feet to the mile—points to south-east, and this flatness explains that the formation crops out over an area of over six miles at the widest portion of the belt. The clay-formation appears to lie in eroded portions of the red sandstone, and is generally covered by sands and gravel of the glacial or ice-period. The best fire-clay is obtained around Woodbridge. It supplies the raw material to the potteries and firebrick works at Trenton, Philadelphia, Newark, and New York City.

Of the many analyses for which we are indebted to Prof. Cook and his able assistants on the geological survey of New Jersey, only one is here selected, showing that the clay is quite equal to those of Bischof's Classes I. and II., especially in high percentage of alumina:

Alumina	38.24	Ferric oxide	0.96
Silica, combined	43.90	Potassa	0.15
" sand	1.10 (46.30)	Soda	0.00
Titanic dioxide	1.30	Water, combined	14.10
Magnesia	0.11	Hygroscopic water	0.70
Lime	trace.		

Locality, H. Cutter & Son's pit at Woodbridge.

This clay forms a layer six feet thick and is overlaid by a dark-colored sandy clay. It is quite white and much used for paper-sizing. It is very plastic, but somewhat water-stiff. Lignite coal lies in the dark clay. The economic importance of these clay-beds may be inferred from the product, which was in 1874 about 260,000 tons, valued at $927,500. The price varies from $1.50 to $13 a ton (George H. Cook, *Geological Report on Clays*, 1878). Pennsylvania, although not quite so rich, is yet well provided with good clays. In the south-eastern portion—Chester and Delaware counties—we find kaolin in place upon the coarse granite portions of the gneiss-rock. This material, after refining, is mostly used for sizing in paper-mills. On the northern side of South Mountain, in Lehigh county, we find an excellent clay lying in eroded cavities of the lower Silurian limestone; white, red, yellow, and brown clay in close proximity to limonite iron ore-deposits. Good clays are found in the coal-measures of the anthracite and of the soft-coal basins. They are generally sandy, and will not stand higher than Class VII. Others of the drift-formation are too high in fluxing oxides to be utilized.

The following analysis shows a good quality from the clay which accompanies coal-bed A. It was from the neighborhood of Clearfield (McCreath's *Report* in the *Second Geological Survey of Pennsylvania*, 1879):

Alumina	37.51	Lime	0.49
Silica	44.05	Magnesia	0.151
Titanic dioxide	1.84	Potassa and soda	0.055
Ferrous oxide	0.82	Water, etc.	15.21

Chemical Properties of Clay.—Clay can be decomposed by sulphuric acid and by hydrochloric acid when digested with these acids for some time at the boiling heat of water. If enclosed in a strong air-tight vessel, so that the heat generates pressure, the decomposition is more rapid and more complete. In either case the alumina is dissolved, and the silica separated as a flocculent hydrate. The sandy portion remains unaltered, except when it contains carbonates of iron, calcium, magnesium. These metals will enter the solution, whilst CO_2 escapes in bubbles. If the clay has first been heated for some hours at a cherry-red heat, whereby it loses its water and plasticity, the action of the acids is more rapid. This property is utilized on a large scale for the manufacture of alum, whose valuable component for dyeing and printing is the aluminium sulphate ($Al_2S_3O_{12}$ + Aq). This sulphate is combined in alum with either the sulphate of ammonium $(NH_4)_2SO_4$, or the sulphate of potassium, K_2SO_4. This double salt is very little soluble in cold water, and may be obtained by crystallization in great purity. But the potassium and ammonium go to waste in the applications of alum. In later years the sulphate of aluminum has been produced by itself. As no purification by crystallising can be employed, this manufacture requires a very pure clay to start with—one which is notably free from iron compounds. The *alum clays* may be inferior as refractory material containing alkalis, lime, and magnesia. The application of clay in paper-mills is not based on chemical foundation. The fine particles of the white clay are simply cemented to the fibre by means of aluminic hydrate. It serves to give body to wall-paper.

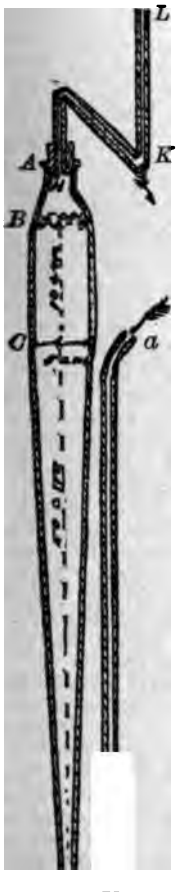
The manufacture of china porcelain rests on observation of the fact that certain white clays will form a semi-transparent, hard, ringing, and impermeable body when exposed to a white heat. Analysis has shown that this property rests upon a certain proportion of fluxing oxides in combination with the pure clay. Some clays have naturally this composition, but in most cases it is necessary to compose the mixture artificially. The German porcelain is made by addition of finely pulverized felspar; the English, by adding calcium oxide in the form of chalk or gypsum. The French use both.

Another very important property of clay is that when heated with the proper proportion of pure limestone (carbonate of calcium) at a high red heat, it will form a hard, ringing, cinder-like body—that is, the calcium has combined with the silica and alumina, the carbonic acid has been expelled. If this mass be finely ground and the powder stirred with water, it will soon set, and by degrees become of stony hardn[illegible] in water. This compound is [illegible] Portland, cement. Some limestones [illegible] with the right proportion of clay [illegible] the material for the natural h[illegible] ment, and are usually called "[illegible]

Examination of Clay.—A c[illegible]

…bl the value of a given clay, or the relative value …of one and the same clay-bank, embraces: …. The …uation of the ratio between sand- and clay-…, and, again, the proportion of coarse to fine …; 2. The determination of the degree of refrac… 3. The degree of porousness; 4. The degree …g power; 5. The color of the clay after burn…; 6. A …nplete and very quantitative analysis. first five … be made by any intelligent per…; the … will therefore be described. The …h t… …only be made by a very competent chem… if it… to be of any use at all; the methods of … therefore not of general interest, and will …ed.

1. *…rmination of Sand- and Clay-Substance.*—…le must be taken so as to represent the aver… …not or of a clay-bed. It should be allowed to … thoroughly air-dry (plastic clays should be cut … plates to expedite this process). Five grams … grains) of the dry substance will then be placed in … dish and thoroughly disintegrated with … boiling for at least one hour, replacing the … water. Thus prepared, the sample is …ough a 50-inch sieve into the funnel-shaped … ABDEFC (represented in the adjoining figure). This vessel was first used and described by E. Schöne (*Schämmanalyse und ein neuer Schlämmapparat*, Berlin, W. Müller, 1867), and of all proposed it is the most perfect. It can be bought for about four dollars from any of the larger houses dealing in chemical glass-ware. The dimensions are given in centimetres and millimetres. It must be securely fixed to stand in a vertical position. The space BC is exactly cylindrical; the inner diameter at D, 4 mm.; DEF is a correct semicircle; the tube DEFG must not be less than 4–5 mm. in inner diameter. The end of G has been connected by a rubber tube of equal diameter with a sheet-tin water-reservoir, constructed as a *Mariotte flask* to ensure equal constant outflow. The rubber tube carries a clamp-screw. Into the neck A the bent barometer tube HJKL is well fitted with a good cork. The bends at J and K must be sharp (without reducing the diameter), and JK is inclined 40–45°. At K the tube has a hole, not larger than 2 mm., directly in the line KL; the rim of this hole is well rounded. The branch KL is 100 cm. long, and graduated from the point K into millimetres for the first 3 cm.; from 5–10 cm., into ½ cm.; from 10–50, into ½ cm.; from 50–100, into ¼ cm. This pipe is very important; it acts as a pressure-gauge. Before washing the sample into the tube, the clamp is opened fully, to expel any air-bubble from the apparatus. Then, closing the inflow, the funnel is emptied by means of a syphon,



and while the sample is introduced a very slow inflow is maintained to prevent any heavy grains from clogging the tube at D. Placing the cork in the neck and a beaker-glass under the hole K, the cylindrical portion BC fills in about eight minutes, then rises more rapidly in the neck; the turbid water flows from K, and the lines in the branch KL. Now it only remains to regulate the inflow in such a manner that the velocity of the water in the cylindrical tube BC will keep in suspension those particles of the clay which it is intended to separate. For a given apparatus this velocity is measured directly by the column of water in the gauge KL. As no two apparatus are exactly alike, it is necessary to construct a table for each instrument by noting the quantity of water which flows through K in a minute under various heights of the column in KL. The diameter d of BC being known—say exactly 5 cm.—the gauge registering 2.5 cm., $= h$, and the volume of water V flowing from K being 50 cc. per minute, the velocity c in BC will be per minute,

$$V = c\frac{\pi d^2}{4} \qquad c = \frac{4 \times V}{\pi d^2};$$

$$c = \frac{4 \times 50}{3.141 \times 25} = 2.55 \text{ cm.},$$

and per second $= 0.042$ cm. $= 0.42$ mm.; when the column, $h = 25$ mm. Now, by varying h ascending and descending, values will be found which can be easily laid down in a parabolic curve; and thus for any desired velocity in actual experiment, the corresponding h can be read from the curve.

Since the sandy particles vary in diameter from 1 mm. to microscopic sizes, it is not possible to draw an absolute line of separation between the clay-substances and the sand. According to Seeger, Schulze, and Bischof, it is most practical to wash first with a velocity $c = 0.18$ per second until the water shows but a slight milky turbidity. The particles going over at this velocity cannot have a larger diameter than 0.01 mm. This is clay-substance. The receiving beaker-glass is now replaced with an empty one and the velocity increased to 0.10 mm. per second. The material going over at this rate ranges between 0.01 and 0.025 mm. in diameter. It shows still a small degree of plasticity. What passes over at a velocity of 1.5 mm. may be designated as "dust-sand," ranging in size from 0.025 to 0.04 mm. Fine sand from 0.04 to 0.33 mm., and everything above the last size, would be called "coarse sand." The solid materials in the several beaker-glasses are allowed to settle, the clear water drawn off; the residue, rinsed into small porcelain dishes, is evaporated to dryness, weighed, and reserved for further examination, microscopic and chemical.

This method is serviceable in the examination and comparison of soils. There are, in fact, nothing but very impure clays, going all the way to nearly pure quartz sand.

2. *Determination of the Degree of Fusibility.*—For this purpose a clay is selected of known excellence, like that from Saarau, or an artificial mixture is prepared of pure alumina and pure silica, in the proportion of 1 : 1½. One part of the clay under examination is then intimately mixed with one, two, three, four, or more parts of the No. 1 clay or of the artificial clay. These mixtures are shaped into cylinders of equal size, together with one of the clay by itself. After drying they are exposed to the same intense white heat in a wind- or a small blast-furnace. Sup-

posing, now, that the mixture of 1 to 3 showed the least effect like the No. 1 clay, then the clay in question would be $100-(3\times10)=70$. This test is the most practical of all. It gives with least expenditure of time and money a perfectly reliable basis upon which the value of a given clay may be considered.

3. *The Degree of Binding-Power or Plasticity* may be ascertained by several methods. The most convenient one is based upon the fact that the surface of dry plastic clay when rubbed with the finger only leaves a fine film of dust on the finger, while a lean clay will yield a powder—the more, the leaner it is. We prepare a finely-pulverized quartz, passing it through a 60-mesh sieve, and mix one grain of the dry clay (which is to be examined) with one, two, three, or four grains of this quartz by rubbing them together in an agate mortar. Then add water and form thick cream of each sample; place it with a spatula upon a slab of plaster of Paris. It will very soon be of sufficient stiffness to be moulded into a prism or other convenient shape, each one being marked with the number equal to the parts of quartz. When thoroughly air-dry, each one is subjected to the abrading action of the finger by passing it over once; that number which stands the rubbing without yielding powder gives the degree of plasticity. If pure plastic clay-substance will take 10 parts of quartz, its plasticity is 10; one which takes 7 parts of quartz will have the degree 7; and so forth.

4. *The Degree of Shrinkage.*—The sample of clay must be well mixed with water until it forms a cream. This is stiffened upon a plaster slab until it easily parts from the latter by a shrinkage beginning. It is now moulded into a prismatic body of $\frac{1}{8}$ inch in thickness, $\frac{1}{2}$ inch wide, and 4 inches long. Thus it is placed upon a glass plate of corresponding size and its weight taken. A very sharp incision is made near each end, and the distance between the two measured to $\frac{1}{100}$ of an inch. The clay is left standing at a dry place until the weight does not change sensibly; then it is dried at increasing temperature in an air-bath up to 130° C. until the weight remains constant. If the distance between the two marks be now measured, the difference between the first and the last measurement gives the linear shrinkage, whilst the volume of the evaporated water gives the cubic shrinkage. If the dimensions of the wet prism are exactly $\frac{1}{8}\times\frac{1}{2}\times4$, its volume will be $\frac{1}{4}$ cubic inch. The loss of water in grams is equal to the volume of the same number expressed in cubic centimetres (one cubic inch = 16.129 cubic centimetres). Now, suppose that for a given clay the loss of water had been 0.2 gram = 0.2 cubic centimetres. Then the cubic shrinkage would be $\frac{1}{4}\times16.129\div0.2=0.2016$, or nearly $\frac{1}{5}$. (G. A. K.)

CLAY, Cassius Marcellus, an American statesman, son of Gen. Green Clay, was born in Madison co., Ky., Oct. 19, 1810. He graduated at Yale College in 1832, and began to practise law. In 1835 he was elected to the State legislature, and again in 1837 and 1840, but his strong opposition to slavery interrupted his political career. In 1844 he advocated the election of his relative, Henry Clay, to the Presidency, and made a tour in the Northern States in his behalf. In 1845 he began to publish in Lexington a weekly newspaper called the *True American*. It encountered violent opposition from the mob, and after several conflicts he was obliged to have it printed at Cincinnati. When the War with Mexico commenced, although he had opposed the annexation of Texas, he entered the service as captain, and was taken prisoner. In 1848 he advocated the election of Gen. Zachary Taylor, the Whig candidate for the Presidency. When, the next year, the constitution of Kentucky was to be revised, he gathered a convention at Frankfort in favor of the emancipation of the slaves. In 1850 he left the Whig party and became anti-slavery candidate for governor, but received only 5000 votes. In 1861 he was appointed minister to Russia by Pres. Lincoln; he returned in 1862 to take part in the Civil War as major-general of volunteers, but after a year's service resumed his position in Russia, and remained there till 1869. A volume of his speeches was published in 1848, and his *Life, Memoirs, Writings, and Speeches* in 1886.

CLAY, Henry (1777–1852), an eminent American statesman, was born in a swampy district called "The Slashes," in Hanover county, Va., April 12, 1777. His father, a Baptist preacher, died when Henry, the fifth of seven children, was only five years old, leaving for the support of the family a little farm with two or three slaves. The widowed mother, a woman of considerable ability, struggled bravely under her burden. At the district school Henry received only the rudiments of education, and at the age of thirteen was compelled to work on the farm. The next year he became clerk in a drug-store in Richmond, and in 1792, when his mother married again, his stepfather, before removing to Kentucky, procured for him a clerkship in the Virginia court of chancery. Henry's remarkably neat penmanship soon led to his employment as amanuensis by Chancellor George Wythe, one of the signers of the Declaration of Independence and deservedly eminent as a jurist and classical scholar. Four years of daily association with this Virginia gentleman of the old school sufficed to give "the Millboy of the Slashes" that courtly grace which in later years captivated all who met him, while his clerkship taught him the methodical business habits which served him in good stead when he was Speaker of the House of Representatives and leader of a great political party. He never became a scholar, nor even a student of history, but he cultivated the art of oratory, for which Nature had amply endowed him with a receptive mind, a ready tongue, and a voice of wonderful clearness and compass. By the advice of his aged friend, the chancellor, he studied law, and after spending a year in the office of the State attorney-general, Robert Brooke, he was admitted to the bar in 1797. Then, barely twenty years of age, he removed to Lexington, Ky., where his fluency of speech soon found abundant employment in defending criminals and settling disputed land-claims. In 1799 he married the daughter of Col. Thomas Hart, the most prominent man in the town, and his married life was eminently happy.

See Vol. V. p. 530 Am. ed. (p. 610. Edin. ed.).

When the people of Kentucky were forming their first State constitution, in 1799, Clay and other young men, seeing the evils of the slave system, urged the insertion of a clause providing for the gradual abolition of slavery—an idea to which he adhered throughout life. But the effort was in vain, as was his similar effort fifty years later. Though his advice on this question was summarily rejected, his hearty good-fellowship made him a favorite with all classes. His influence was sought by the scheming and plausible Aaron Burr in his prospecting-tour in the West; and when Burr was arrested on a vague charge of treason, the chivalrous young lawyer secured his discharge—a result which destroyed the professional reputation of

"Jo" Daviess, the prosecuting attorney. In 1804, Clay had been elected to the State legislature, and when, two years later, Gen. John Adair resigned his seat in the United States Senate, Clay was chosen to fill the vacancy, though he had not yet attained the constitutional age.

No one could better appreciate than a patriotic Kentuckian the necessity of binding more closely the remote settlers beyond the Alleghenies to the people of the seaboard; and when President Jefferson, in his message of 1806, proposed that part of the money then beginning to accumulate in the national treasury should be spent on roads and canals, he found a ready supporter of his views in the young Senator from Kentucky. Clay's first speech in the Senate was in favor of building a bridge over the Potomac; he next proposed an appropriation for a canal around the falls of the Ohio at Louisville, and introduced a resolution directing the Secretary of the Treasury to report on the whole subject of internal improvements. In 1807, Clay was again a member of the State legislature, and in the next year was made Speaker of that body. In his advocacy of President Jefferson's policy of non-intercourse with Great Britain, he urged the members of the legislature to pledge themselves to wear nothing that was not of home manufacture. For this he was denounced by Humphrey Marshall as a demagogue. A challenge and a duel ensued, in which the combatants fired twice and were both wounded slightly. In 1809, Clay was again elected to fill a vacancy in the United States Senate, and began to urge the systematic protection of American manufactures. His speech that attracted most attention during the term was in opposition to the rechartering of the United States Bank, the arguments of which were afterward employed by President Jackson in his bank veto of 1832, when Clay had changed his views on that subject.

In 1811, Clay was elected to the House of Representatives, and, though this was his first appearance in that chamber, he was already so well known that he was chosen Speaker by a large majority. The younger members of the Republican party were eager for war with England, whose wanton outrages on the American flag on the high seas had excited public feeling to the highest pitch. Led by Clay and Calhoun, they forced President Madison to declare war, although no proper preparations had been made for it. In spite of opposition in the House, the collapse of the finances, and repeated disaster in the field, Clay maintained the war-spirit to the close of the contest. When Great Britain had conquered a peace in Europe, and no longer had actual need to search American ships to discover possible subjects, she quietly relinquished the practice which had given offence and expressed her willingness to enter on negotiations for peace. Madison and his Secretary of State, Monroe, anxious for peace on any terms, gradually receded from any attempt to obtain an acknowledgment of the principle for which the war had been undertaken. Clay, being appointed one of the commissioners to frame the treaty, resigned the Speakership on Jan. 19, 1814, and sailed for Europe. He was the representative of the interests of the people of the Mississippi Valley, as John Quincy Adams was of those of New England, while the adroit and conciliatory Gallatin was assiduously employed in bringing them to common ground. The negotiations were concluded Dec. 24, 1814, but Clay did not return to the United States until the following September. In the mean time, he had been unanimously re-elected by his constituents, and when the House assembled he was again chosen Speaker.

The costly experience of the war had proved to Clay's mind the necessity of a national bank for public emergencies. Gallatin, the ablest—in fact, the only—financier of his party, had pleaded for such an institution, but was unable to break down the prejudices of years. A. J. Dallas, who followed him in the difficult position of Secretary of the Treasury, managed to obtain for the same plans the support of Clay, Calhoun, and Webster. The success of the bank was such that Clay never hesitated to assume its championship. In all other respects the war had fully confirmed the views which Clay had inherited from Jefferson. The political independence of the nation was to be confirmed by establishing the industrial independence of the people; the protection of American manufactures was to go hand in hand with the improvement of internal communications. But the same love of liberty which impelled him to foster American institutions made him the champion of all oppressed people who were struggling to win for themselves the blessings of self-government. His memorable speech in 1818 in favor of recognizing the South American republics was read by Gen. Bolivar at the head of his troops. In a similar way, in 1822, Clay espoused the cause of the insurgent Greeks, and roused a strong spirit of sympathy with their war for independence.

In American history, Clay is especially noted as the compromiser who deferred from time to time the crisis of the irrepressible conflict between the systems of free labor and slavery. His ingenuity in this regard was first shown in the Congressional struggle over the admission of Missouri as a State. He suggested the balancing of Missouri as a slave State with Maine, and when that plan was rejected secured a committee of conference, which under his guidance prepared the celebrated Missouri Compromise. By this, Missouri was admitted without restrictions as to slavery, while in all the remaining portion of the Louisiana Purchase lying north of 36° 30′ slavery should be for ever prohibited. To Clay's tact and personal influence the acceptance of this scheme was due. Yet at the very time when, in the estimation of the great body of his fellow-citizens, he had thus saved the Union, he was compelled to retire from Congress on account of the inadequacy of his salary to his needs. It is true that in his younger days his good-fellowship had led him to share the gambling habits of his associates, but after he became Speaker of the House, though an inveterate whist-player, he strictly limited his stakes. In 1816 he had voted to increase the pay of members of Congress to fifteen hundred dollars a year, but this vote had nearly cost him his seat at the next election. He now retired to devote himself to his private affairs, which had suffered while he was attending to his public duties; but in the next term he returned, and had the satisfaction of seeing the independence of Greece recognized by the United States.

As the close of Monroe's administration drew near, the clique which had long been dominant in national affairs marked William H. Crawford, then Secretary of the Treasury, as his successor, and the Congressional caucus gave him the nomination. But the younger men gave no assent to this plan, and the Presidential campaign became a personal contest between four candidates nominally of the same party. While John C. Calhoun received 182 electoral votes

for the Vice-Presidency, the votes for President were thus distributed: Andrew Jackson, 99; John Q. Adams, 84; W. H. Crawford, 41; Clay, 37. When the choice devolved upon the House of Representatives, voting by States, Clay, as having the lowest number, was excluded, and his friends, joining with those of Adams, secured for the latter thirteen States, while Jackson had seven and Crawford four. Jackson had already been at enmity with Clay, on account of a speech in which Clay had condemned Jackson's conduct in his invasion of Florida in 1818; this new cause of offence inspired in him a deadly hatred. When Clay accepted the position of Secretary of State under President Adams, Jackson's partisans never wearied of crying, "Bargain and corruption!" while the reckless and intractable John Randolph uttered his well-known sarcasm on "the coalition of Puritan with blackleg." This language led to a duel between Randolph and Clay, April 8, 1826, in which each fired two shots without effect.

In 1828, Gen. Jackson attained the object of his ambition, being elected to the Presidency, by a majority of both popular and electoral votes, over John Quincy Adams, his only competitor. His hour for revenge had come, and he made a clean sweep from office of every person known to be, or suspected of being, a friend of Clay, while appointments were lavished on those who were especially hostile to him. The United States Bank, whose championship Clay had undertaken, was doomed to share his fate.

Meantime, Clay recruited his energies in the peaceful pursuits of farming and the outdoor life dear to every Kentuckian, until 1831, when he was again elected to the United States Senate. Here he defended the protective tariff, which was then filling the national treasury to overflowing, though also exciting discontent, especially in South Carolina. In support of his financial and economical views, which he had now fully developed in what he called "the American system," Clay organized a national party, which subsequently assumed the name of "Whig." In 1832 this party, with Clay as its Presidential candidate, seemed likely to be successful; but Jackson, who had been pledged to a single term, thrusting aside Calhoun, again entered the field, and through his overwhelming popularity with the masses carried off the prize. Bitter as was the animosity of the rival candidates, their devotion to the Union was shown when South Carolina, under the influence of Calhoun, declared the tariff acts null and void and threatened to establish an independent government if they were enforced by the Federal authorities. This declaration was made by the State convention which assembled Nov. 24, 1832, and in reply President Jackson issued his famous proclamation of Dec. 11, declaring his determination to enforce the law at all hazards. Clay, with his ingrained tendency to compromise, now sacrificed the principle of protection by proposing that all duties exceeding 20 per cent. *ad valorem* should be reduced to that uniform rate by removing annually one-tenth of the excess. This compromise was accepted by both Houses, even Calhoun, who had resigned the Vice-Presidency and was now a member of the Senate, assenting. Thus once more was threatened disunion averted by compromise.

After the war of 1812, for which he was in a large measure responsible, Clay was never again in favor of an appeal to arms for redress of national wrongs or grievances. Being chairman of the committee on foreign affairs, he curbed Jackson's intention of making reprisals on French vessels as the speediest way to obtain indemnity for the spoliations committed on American vessels during Washington's administration. In 1836 he was prompt to urge the recognition of the independence of Texas, then in revolt against Mexico, though a few years later he strongly opposed its annexation, as involving his country in war.

The financial disasters of 1837 prepared the way for a change of national policy, but the Whig convention at Harrisburg in 1840 passed by the true leader of the party and selected Gen. William Henry Harrison, a Western soldier without political record, as a more available candidate for the Presidency. To win favor at the South, John Tyler of Virginia, a Democrat who had opposed Jackson's transfer of the government deposits, was nominated on a Whig platform, of which he professed his acceptance. After the most exciting election campaign which had yet occurred in America, noted especially for its monster meetings and processions of workingmen, these candidates were elected. Harrison's death within a month after his accession placed Tyler in power. Clay had prepared the measures promised in the platform of the Whig party, but Tyler vetoed the bill distributing the proceeds of the sales of the public lands among the States and the bill incorporating a new Bank of the United States. Then the President gave his friends the outline of such a bank as he considered constitutional, and a bill was passed embodying some of these features. But in vain, for again the President vetoed the bill; and the Whig members of the Cabinet, except Daniel Webster, the Secretary of State, forthwith resigned. The party, thus cheated of its victory, turned in despair to Clay, now recognized as the unflinching champion of its principles, while the Democratic party, so lately defeated at the polls, renewed its strength under the fostering care of the administration. In March, 1842, Clay, wearied with the protracted struggle, resigned his seat in the Senate and delivered a memorable farewell speech, reviewing his political career since his entrance to that body. In 1844 he was called from his retirement to become the Presidential candidate of the party, and for a time had a fair prospect of success. The opponents of slavery, however, had been driven by the steady and threatening growth of that institution, and especially by the proposed annexation of Texas, to organize a political party pledged to the repression, if not the absolute extinction, of that system. Clay was a slaveholder, and had for years unsparingly denounced the abolitionists as the enemies of the Union; yet in his own State he had advocated the emancipation of the slaves and their transportation to Africa, and he was president of the American Colonization Society, which had been formed to carry out this idea. He had also voted in favor of the right of petition when that was denied in Congress to those who asked for the abolition of slavery. In consequence of his ambiguous attitude, he was called upon for explicit statements of his views on the question of the day, and in August he ventured, in a letter to some friends in Alabama, to declare that he would be glad to see the annexation of Texas with the [illegible] consent of the Union, and upon just and fair [illegible]. By this declaration, which was not [illegible] win favor in the South, he lost [illegible] many in the North. These [illegible] erty party, which had nominated [illegible] James G. Birney, who had [illegible] in Alabama and removed to the [illegible] mont secured enough votes in [illegible]

to give the electoral vote of that State to Polk, an avowed friend of the annexation policy. But the annexationists, led by John C. Calhoun of South Carolina, did not wait even for Polk's accession; in spite of constitutional restrictions, the project was hurried through before Tyler left the Presidential chair, and to Polk was left the inevitable sequence of a war with Mexico. Clay had opposed the course which led to war; but when the war came, he would not refuse whatever was necessary to the success of the army. In the course of the war he was called to mourn the loss of his son Henry, who was killed, while in command of a regiment, at the battle of Buena Vista, Feb. 22, 1847.

At their next national convention, held in Philadelphia, in June, 1848, the Whigs nominated for the Presidency Gen. Zachary Taylor, whose military reputation had been acquired in the Mexican war, and this, with his Southern connections, was sufficient to secure his election. In the same year Clay was again elected to the United States Senate, though he did not take his seat till Dec. 3, 1849. He had come forth, in spite of the infirmities of age, to make a last effort to stem the rising tide of disunion. Asserting that his country's danger sprang from the abolitionists of the North rather than from the fire-eaters of the South, he devoted all his remaining strength to the repression of the former and the conciliation of the latter. As the most effectual means for this purpose, he prepared his last great compromise, the "Omnibus Bill" of 1850. By its multifarious provisions Congress was to be precluded from interfering with the introduction of slavery into territory acquired from Mexico, California was to be admitted to the Union without any restriction on the subject, the slave-trade between the States was allowed to go on, and United States officers in the various States were empowered to restore fugitive slaves to their masters. As an offset to these pro-slavery measures, the national disgrace of the slave-trade in the District of Columbia was partially removed. This Omnibus Bill, reported unanimously by a committee of the Senate, obtained the support of Daniel Webster and other Northern Whigs, but led to a fierce parliamentary contest, which was protracted through six months. It was found impossible to enact these measures in one bill, as Clay had earnestly desired, but separately they secured majorities, and became law in the summer of 1850, after the death of President Taylor and the accession of Millard Fillmore. Clay was thus permitted to rejoice in the belief that he had again been the instrument of averting a dissolution of the Union. Though widespread opposition was shown in the North to the enforcement of the stringent Fugitive-Slave law, yet generally the commercial and professional classes of the North accepted the compromise and urged observance of its terms. Clay continued in the Senate, though his physical strength was exhausted and he was able to take no part in its debates. He died at Washington, July 29, 1852. On the announcement of his death Congress immediately adjourned, and on the xt day leading members of both Houses
] qı tributes to his memory.

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ə, but to mould the masses of the people to his will. Yet the effect of his speeches was rather immediate than permanent. When examined critically, little can be found in them to account for their powerful effect on his auditors. Clay was especially successful in great debates which called forth at once the native powers and the intuitive perceptions of the participants. Then his knowledge of human nature, his quickness in seizing points of advantage, the charm of his manner, and the brilliancy of his speech readily gave him the victory. The effect of the doctrines which he advocated and of the course which he pursued on the progress of the country has been but slightly indicated here, as the full treatment of it belongs to history rather than to a biographical sketch. As the leader and the chief exponent of a great political party, he exercised immense influence on the destinies of his country. Yet his career seems more remarkable for its defeats than for its victories. The latter, won by compromise, though full of illusion at the time, proved transient and ineffective; yet the principles which he advocated, though sometimes sacrificed for a temporary purpose, were really working their way into the institutions of his country. Throughout his career he was devoted to the preservation of the Union as the only safeguard of liberty and popular government, and to the protective tariff for the maintenance of national independence.

See *Life, Correspondence, and Speeches of Henry Clay*, by Calvin Colton (6 vols., N. Y., 1864).

CLAYTON, JOHN MIDDLETON (1796–1856), an American statesman, born at Dagsboro', Sussex co., Del., July 24, 1796; died at Dover, Del., Nov. 9, 1856. He was descended from Joshua Clayton, an English Quaker who came over with Penn and settled in Delaware. James Clayton, the grandson of Joshua, a Sussex farmer, married Sarah Middleton, of Virginia ancestry, and John M. was their second child and eldest son. Receiving some preparatory instruction at schools near his home, he passed the examination at Yale College, and was admitted to its classes on the day he was fifteen years old. He graduated in the class of 1815 with the highest honors, having meantime studied with diligence, not even returning home for a vacation. Entering the office of his cousin, Thomas Clayton (afterwards chief-justice of Delaware and United States Senator from that State), he began the study of law, and in March, 1817, went to the law-school at Litchfield, Conn., where he remained twenty months, studying, he said, sixteen hours a day. In 1819 he was admitted to the bar in his native county, but fixed his residence at Dover, the State capital, in the adjoining county of Kent. Here he came into competition with several lawyers of unusual strength, including his preceptor, Thomas Clayton; Willard Hall, subsequently, for many years, judge of the U. S. district court; and Henry M. Ridgely, who was United States Senator from 1827 to 1829. He took, however, from the first, a high position. His ability as an advocate was remarkable; his power over juries so great that the opinion of Mr. James A. Bayard, his political rival, is quoted to the effect that he had no superior in the country as a jury lawyer. His career at the bar continued ten years, and won him thorough acquaintance and great repute with the people of Delaware, with whose character and tastes he had a singularly perfect sympathy, enabling him to exert with them, during his public career, an influence commanded previously or since by no other man. In 1822 he married Sally Ann, the daughter of Dr. James Fisher of Camden, near Dover,

but she died three years later, leaving two infant children, one but a few days old. Mr. Clayton's devotion to her memory was such as to influence in a marked degree the whole of his after life—more than thirty years—and while he never remarried, he even avoided, to a degree, all female society.

In 1829, Mr. Clayton entered the United States Senate. He had filled several clerkships in the State legislature—one or more of them during his minority—and had served as a member of that body and as secretary of state and State auditor. In 1828, in the fierce Presidential contest between Mr. Adams and Gen. Jackson, he had thrown himself warmly into the fight in favor of the former's re-election, and the electoral vote of Delaware being so decided, the legislature chosen was also in accord with Mr. Clayton's friends. He was therefore chosen Senator, and he entered the Senate at the special session in March, contemporaneously with the opening of Jackson's eventful administration. In that body he found himself the youngest member, the list of his colleagues containing the names of Webster, Clay, Calhoun, Benton, Hayne, Felix Grundy, Hugh L. White, Edward Livingston, and others of national distinction. His ability, however, was quickly recognized. The first regular session began in December, 1829, and he took part, a few weeks later—March, 1830—in one of the most famous debates of the Senate, that upon "Foot's Resolution," which gave occasion to the great encounter between Messrs. Webster and Hayne. Of his speech in this debate John Quincy Adams records in his *Diary* the judgment that it was "one of the most powerful and eloquent orations ever delivered in either of the halls of Congress." His vigor as an orator and the high order of his capacities as a Senatorial leader gave him rank at once amongst those who were arrayed in opposition to the Administration, and he was one of the most effective of the Senators who antagonized the several radical measures of Gen. Jackson's two terms. He made an energetic inquiry into irregularities in the Post-Office Department, and ultimately secured important reforms in it; he was conspicuous in the promotion of the prompt passage of the "compromise tariff" in 1833, by which Mr. Calhoun and the nullification party of South Carolina were afforded a door of retreat from their threatened rebellion; he advocated effectually the Land Act of 1833, and strongly supported the United States Bank in its application for a re-charter and its resistance to the removal of the deposits and of the pension fund. Voting for Mr. Clay's resolutions condemning the removal of the deposits, he was one of the Senators against whom the President made an issue, by name, in his famous "Protest." His term of office was now closing; he received, however, and accepted, a re-election in 1835 as the proof of the continued confidence of his State. In the autumn of 1836 he resigned, and was appointed a few months later chief-justice of the Delaware courts. His first service in the Senate had therefore continued about eight years and a half. He had been since 1833 chairman of the committee on the judiciary.

Mr. Clayton held his judicial office until August, 1839. The active canvass then begun for the election of Gen. Harrison to the Presidency attracted him irresistibly, and he resigned to enter again the political field. The electoral vote of Delaware had been given to Gen. Harrison in 1836, and was again cast for him in 1840, Mr. Clayton having been one of the most earnest and effective of the Whig speakers in his own and other States. He did not, however, re-enter public life until 1845, when he again took his seat in the Senate, having for his colleague his cousin, Thomas Clayton. His service in that body now continued for four years. He took a prominent part in favor of the payment of the French spoliation claims and in the adjustment of the Oregon boundary question; supported the war with Mexico after it had been entered upon; and actively promoted the nomination by the Whigs of Gen. Taylor as their candidate for President. In March, 1849, he entered the Cabinet as Secretary of State, resigning, upon the death of the President, in July, 1850. During his service in the State Department he negotiated with Sir Henry Lytton Bulwer, then British envoy to the United States, the famous CLAYTON-BULWER TREATY (which see) relating to the proposed construction of a ship-canal in Central America to connect the Atlantic and Pacific oceans. He also, through an agent sent to Hungary, gave expression to the interest felt by the American people in the efforts of that country to gain its independence, and conducted a correspondence with Lady Franklin in reference to the search for her husband.

By the election of 1852 the Whigs, friendly to Mr. Clayton, obtained a majority in the Delaware legislature on joint ballot, but as the Democrats had control in the Senate, it was presumed that they would decline to go into a joint convention for the election of a United States Senator. Early in January, 1853, however, Gen. Cass of Michigan made a speech in the Senate at Washington attacking the Clayton-Bulwer treaty, and criticising Mr. Clayton in connection with it. The feeling in Delaware was such that the Democrats in the Senate agreed to a joint session, and Mr. Clayton was again chosen Senator, his term commencing on the 4th of March following (1853). Taking his seat at that time in the special session, he spoke on the 10th in explanation and defence of the treaty, and on the 14th replied to speeches against it delivered by Messrs. Mason and Douglas. The subject continued to occupy attention at each session during the remainder of his service in the Senate (which closed with his death), and he made other elaborate addresses concerning it. His remains are interred in the Presbyterian church yard at Dover. (H. M. J.)

CLAYTON-BULWER TREATY, THE, a convention between the United States and Great Britain, negotiated at Washington in 1850 by John M. Clayton, Secretary of State, and Sir Henry Lytton Bulwer, British envoy. It consists of nine articles, the preamble to which states its object to be the desire of "consolidating the relations of amity" between the two nations "by setting forth and fixing in a convention their views and intentions with reference to any means of communication by ship-canal which may be constructed between the Atlantic and Pacific oceans by way of the river San Juan de Nicaragua, and either or both of the lakes of Nicaragua or Managua, to any port or place on the Pacific Ocean. . . ."

The vital parts of the treaty are expressed in the first and eighth articles, which, in full, are as follows:

"ART. I.—The Governments of the United and Great Britain hereby declare that neitl the nor the other will ever obtain or maintain fo exclusive control over the said ship-canal; neither will ever erect or maintain any commanding the same or in the vicinit occupy, or fortify, or colonize, or any dominion over Nicaragua, (

...o Coast, or any part of Central America; nor will ...er make use of any protection which either affords ...y afford, or any alliance which either has or may ...e to or with any state or people, for the purpose of ...cting or maintaining any such fortifications, or of ...anying, fortifying, or colonizing Nicaragua, Costa ... the Mosquito Coast, or any part of Central Amer... or of assuming or exercising dominion over the ...; nor will the United States or Great Britain take ...vantage of any intimacy, or use any alliance, connec... or influence that either may possess with any ... or Government through whose territory the said ...l may pass, for the purpose of acquiring or hold..., directly or indirectly, for the citizens or subjects ... the one, any rights or advantages in regard to com...e or navigation through the said canal which shall ... be offered on the same terms to the citizens or sub...jects of the other."

"ART. VIII.—The Governments of the United ... and Great Britain having not only desired, in ...ng into this convention, to accomplish a particu... ...ject, but also to establish a general principle, they ...y agree to extend their protection, by treaty stip...ons, to any other practicable communications, ...ier by canal or railway, across the isthmus which ...s North and South America, and especially to ... ...oceanic communications, should the same ...e ... ...e practicable, whether by canal or railway, ...h are now proposed to be established by the way ... ...huantepec or Panama. In granting, however, ...r joint protection to any such canals or railways as ...by this article specified, it is always understood by ... United States and Great Britain that the parties ...ng or owning the same shall impose no other ...or conditions of traffic thereupon than the ... ... Governments shall approve of as just and ...quita... and that the same canals or railways, being ...pen to ... citizens of the United States and Great ...Britain on equal terms, shall also be open on like terms ...o the ci...ens and subjects of every other state which ... grant thereto such protection as the United ... ... Great Britain engage to afford."

The other articles relate to the particulars in which two Governments undertook to guarantee the ...ty of the proposed canal and secure its com... ... to other nations; to the protection of its ...uilders and their property; to the encouragement of ...ts early construction, etc. The sixth article engages ...he contracting parties "to invite every state with ...which both or either have friendly intercourse to enter ...nto stipulations with them similar to those which they ...ave entered into with each other; . . . and [they] ...ikew...e agree that each shall enter into treaty stipula... with such of the Central American states as they deem advisable for the purpose of carrying out ...great design of this convention—namely, that of ...uting and maintaining the said canal as a ship ... ...nication between the two oceans for the benefit ...nkind on equal terms to all, and of protecting the ..."

...t ... was ... d by the negotiators April 19, ... i... ... approved by the British Gov... ... ... d by the U. S. Senate, the ratifi... ...cha... d at Washington, July 4, 1850. ...he British minister gave no... ... understood the treaty not to ... "British Honduras [Balize] ... which the American Secre... drawn counter-declaration, worded under the advice of the attorney-general, Mr. Reverdy Johnson, to the effect that he (Mr. Clayton) so understood it, that he was informed by Mr. King, chairman of the Senate committee on foreign relations, that the Senate so understood it, but that the treaty referred to and did include "all the five Central American states of Guatemala, Honduras, Nicaragua, Costa Rica, and San Salvador, with all their just limits and proper dependencies." He also declared to the British envoy that nothing in either of these explanatory notes could affect the treaty itself, as no alteration could now be made by either negotiator, and notified him that if he meant to ask any change in its provisions the proposition must go to the Senate. He also defined what he understood by the term "dependencies" of Balize—*i. e.*, small islands quite near (a marine league or thereabouts) the town of Balize. One of these was Cayo Cafina, or St. George's Key, the others a cluster of small islands forming a triangle, and mentioned in the treaty of London concluded in 1786 between Great Britain and Spain. By this treaty Great Britain received the permission for her subjects to land and cut dye-woods, mahogany, and other natural products on the Balize coast, and after Mexico became independent of Spain a like grant was negotiated with that country. But in acts of Parliament passed in 1817 and 1819, Great Britain disclaimed all dominion or sovereignty over Balize and its dependencies. The rights of that country with reference to them were, at the time of the treaty (of 1850), as represented by Mr. Clayton in his speeches in the Senate, of the narrowest description—simply to land and cut and remove timber, etc., making no colony or settlement except for this purpose, and refraining even from entering upon the cultivation of artificial products of the soil. (These rights, however, seem to have been enlarged. See BRITISH HONDURAS, in ENCYC. BRIT., Vol. XII.

This explanation seems necessary, because the questions involved in it were the chief occasion of elaborate debates upon the treaty in the United States Senate in 1853, 1854, 1855, and later. In Jan., 1853, Mr. Cass of Michigan attacked the treaty, and criticised Clayton for having conceded too much in saying it did not refer to Balize. In March of the same year Clayton elaborately replied, and made rejoinder to speeches of Messrs. Mason and Douglas, who spoke in support of Cass's views. On Dec. 12, 1853, the Senate called on the President for correspondence that had taken place concerning the treaty between the State Department and the British Foreign Office; and this being communicated on Dec. 30, a second elaborate debate occurred in January, in which Mr. Clayton and Mr. Cass were the principal speakers. In Dec., 1855, the question again came up, the British Government having manifested an apparent uneasiness concerning the treaty. In 1881 the proposed construction of the ship-canal of DeLesseps across the Isthmus of Panama, revived interest in the treaty and its bearing on the occupation of American soil by Europeans. Correspondence took place between the American Secretary of State, Mr. Blaine, and his successor, Mr. Frelinghuysen, on one side, and Lord Granville, on the other. Nothing was done, however, and DeLesseps' scheme failed on account of the physical and financial difficulties.

Concerning the general character of the treaty, Mr. Reverdy Johnson, in a letter written in 1853 and read in the Senate, said: "It is the first instance within my knowledge in which two great nations of the earth have

thus endeavored to combine peacefully for the prosecution and accomplishment of an object which, when completed, must advance the happiness and prosperity of all men." In Jan., 1854, the British Government having suggested a new treaty, Mr. Cass himself said he could not see what the United States could gain by it. "The first," he continued, "is well enough if carried out in its true spirit. . . . What we want, and all we want, is that the Central American states should be let alone to manage their own affairs in their own way. . . . And all this is precisely what the Clayton-Bulwer treaty would effect if fairly interpreted and fairly executed." Mr. Seward, in concluding his eulogy upon Mr. Clayton in the Senate in 1856, declared that the negotiation of the treaty was "the first universal fact in the history of the world—a fact indicating an ultimate union of the nations. . . . Whatever difficulties have hitherto attended the execution of that great treaty, whatever future difficulties may attend it, the treaty itself is the bow of promise of peace, harmony, and concord to all nations."

See the *Congressional Globe* for the Senate debates on the subject, and the volumes of executive documents, etc., for correspondence relating to the treaty. (H. M. J.)

CLEARING-HOUSE. This is an institution established by banks in large cities for the settlement of mutual claims by the payment of the difference. The total of the claims is called "clearings," and the differences are called "balances." The clearings mainly consist of checks held by different bankers who receive them in the way of ordinary deposit. The process of clearing is a very simple one, and is substantially the same in all clearing-houses. At a certain hour in the morning—usually ten o'clock—every bank which is a member of the clearing-house sends a clerk or deputy and a messenger. The deputy takes with him all the checks on other banks belonging to the clearing-house that have been received by his own bank during the preceding day. Each bank has a desk there, and all of them are arranged in a certain order. When the work of clearing begins, each deputy is found at his desk; and he receives from the messengers of the other banks in turn all the checks and exchanges held against it for payment. When the messengers deliver their exchanges, they take a receipt for the amount. When they have made the tour of the room, each bank will have received all the checks held against it by the other banks belonging to the clearing-house, and will have delivered to the messenger of every other bank all the checks and exchanges it holds against it for payment. Each bank is then credited on the books of the clearing-house with the amount due to it from other banks, and is debited with the amount it owes to the other banks belonging to the clearing-house. If a balance is due to a particular bank it is said to have "gained," but if there be a balance against it the bank is declared to have "lost," the amount of the difference. The reader will perceive that the sum-total of the losses of the losing banks must be precisely equal to the sum-total of the gains of the gaining banks. The balances, therefore, against some of the banks which are paid to the clearing-house are paid over by that institution to those banks which have balances in their favor. Within a certain hour of the day the debtor banks must pay into the clearing-house the sum due by them, and with the funds thus received at a later hour the creditor banks are paid. This is a purely voluntary association, and its success depends on the faithful performance by each member of its obligations. The advantages of the system are so great that there has never been any serious difficulty in the way of securing an easy compliance with the regulations except when banks have failed and had not the funds to respond. A clearing-house may be legally incorporated, but generally it is a private association organized among banks to suit their own requirements and convenience.

Clearing-houses, however, are not necessarily limited to banking operations. In London, Paris, and Vienna there are stock-clearings, and recently an attempt has been made to introduce a mode of clearing stock at the New York Stock Exchange. The chief objection to any plan yet devised is that there is not enough secrecy of the operations of the individual members. There is a stock clearing-house in Philadelphia, in which clearings are effected daily. Various plans have been considered for establishing clearings in connection with the leading exchanges in the country, and it is quite likely that this will be eventually done.

The New York Clearing-House is by far the most important institution of the kind in this country, and its leading features are worth description. It does not include all the banks, however; indeed, there are only sixty-three members out of a total of one hundred and seventy-seven banks and bankers. Those outside of the association clear or make their exchanges through some others or by special arrangement. It has been said that without this facility for effecting clearings it would be difficult to do business, as the only method would be to present all the checks they received on other banks at their individual counters by the hands of messengers. A bank which performs a service of this kind for another opens an account with it as with an individual, and undertakes the business on the deposit of such a security as shall be fixed by the parties. The use of this credit balance is the compensation received for doing the business. In thus acting it agrees to pay all checks drawn on the outside bank, and it must give one day's notice to the Clearing-House before it can discontinue exchanging for it. Nevertheless, solvent banks not belonging to the association have no difficulty in getting some member of the Clearing-House to act for them. All the large banks are included in the association, but before a bank can be admitted to membership it must be examined. No fixed limits, however, with respect to the amount of capital or other conditions have been prescribed. A committee of five are chosen annually to supervise and direct the officers of the association, but the manager, who is under the control of the committee, has immediate charge of all the business. The hour for making exchanges is ten o'clock. Between half-past twelve and half-past one the debtor banks [illegible] to the manager the balances against them in actual [illegible] United States legal-tender notes, or United States [illegible]s of deposit. At half-past one, or as soon [illegible] as the amounts can be made up and proved, the [illegible]itor banks receive from the manager the balances [illegible] each of them. If any member of the Clearing-House should fail at the proper hour to [illegible] the balances against it, the amount must be [illegible]ely furnished to the Clearing-House by the [illegible] the defaulting bank in proportion to [illegible] balances against it resulting from the [illegible] day. In such a case the manager is [illegible] requisition for the sum needed, in [illegible] in the general settlement. If [illegible] should not make the deficiency good to

ded for it with the Clearing-House, it would o be a er of the association. Every bank ... on is required to furnish a ... condition to the manager for ... wing the average amount of its loans, , legal-tender notes, circulation, and ... er feature of the association is worth . The k of North America is a chosen ... to r ... in special trust such coin or legal- ... y of the associated banks may choose ... safekeeping, and the depository issues ... exchange for convenient amounts. The ... payable on demand and bear no inte ... only a ... ng the banks, and are re ... ... of Clearing-House ... the invention of Fra ... ... er of the chan ... nk, ... our of the lar ... to join ... a n d ... with the ... ese were received instead of coin by the other banks in payment of balances. Thus the way was paved for establishing the Clearing-House itself two years later.

The first proposition for the establishment of the New York Clearing-House came from Albert Gallatin in 1841. In his pamphlet entitled *Suggestions on the Banks and Currency* he said: "Few regulations would be more useful in preventing dangerous expansions of discounts and issues on the part of the banks than a regular exchange of notes and checks and an actual daily, or semi-weekly payment of the balances."

A more complete account of the New York Clearing-House may be found in the third volume of the *International Review*, p. 595.

This article may be fitly closed with a table showing the clearings and balances of the leading clearing-houses in the United States for 1889, the date of their establishment, number of members, and the total actual or estimated exchanges.

	Established.	Exchanges.	Balances.	Members.
York	1853	$35,895,104,904.65	$6,748,800,679.20	65
	1855	4,772,597,843.00	547,888,963.00	54
ia	1858	3,645,987,807.00	336,705,000.00	41
	1865	3,379,925,188.00	332,255,153.00	20
	1868	987,522,620.00	163,461,257.00	17
cisco	1876	843,386,150.94	126,765,916.49	17
	1866	654,080,350.93	111,557,719.23	19
	1858	650,583,571.15	92,544,618.32	23
ati	1866	565,665,050.00	86,322,000.00	17
Orleans	1872	504,474,843.00	61,685,613.00	15
s City	1873	447,258,231.00		11
ville	1876	359,679,462.81	86,730,234.40	22
dence	1866	262,141,900.00	81,587,600.00	34
ukee	1868	254,431,258.03	45,897,345.53	11
	1883	242,414,800.00	40,094,624.00	17
polis	1881	240,221,068.70	42,128,025.10	16
al	1874	209,409,381.03	27,246,912.01	14
a	1884	208,743,485.00		10
nd	1858	198,272,121.00		11
	1885	194,778,647.72	34,511,067.08	10
	1868	131,155,082.00		14
	1879	127,932,473.79	31,581,182.05	8
o (9 months)	1889	120,977,270.64	21,225,051.03	12
nd		108,510,052.00		
polis	1871	101,936,273.40	23,110,460.02	7
ord	1872	100,913,268.29	30,628,057.91	15
ille	1889	83,707,216.00		10
h	1887	81,546,670.11	16,469,345.04	7
	1888	77,284,173.00	19,426,876.00	10
on	1885	74,946,864.00		
Haven	1873	63,927,220.00	15,752,836.00	10
eld	1872	61,237,632.49	19,695,748.49	10
er	1861	56,583,105.00	14,038,133.00	8
tal, 33 Clearing-Houses		55,646,336,014.68	9,159,210,416.90	
itside of New York		19,751,231,110.03	2,410,409,737.70	

Total Exchanges of 51 Clearing-Houses in the United States $56,348,418,556.09

TIS. a ... f belonging to the nat- ... characterized chiefly ... , ... alous flowers with the ... s, and with achenia terminated ... are mostly climbing plants, ... the p ... le: a few are herbaceous ... the ... c ... are not numerous, the ... ge, ... are found in almost ... The original *klem-* ... periwinkle (*Vinca minor*); *klematitis*, as used by Dioscorides, seems to have been what is now *Clematis cirrosa*, which is indigenous in many parts of Greece. Apparently through the similarity of the names, the plants were all classed under one head by the early herbalists; and when modern botany became a science, the name given to the *Vinca* originally was left with the genus which now bears it. The misapplication of names seems also to have followed some of their common appellations. The species indigenous to England, *Clematis Vitalba*, is

known there as ladies' bower, virgin's bower, and traveller's joy; and, as the terms are employed by Gerarde, Parkinson, and other writers of the time of Queen Elizabeth, there have been modern discussions as to whether the name was given in compliment to the "virgin queen" (Elizabeth) or to the Virgin Mary. Gerarde says the plant makes "bowers fit for maidens to sit under," and numerous pictures of the flight of Joseph and Mary into Egypt represent them as sitting under the shade of this vine. But the earlier herbalists classed the plant with the bryony. The *Bryonia dioica* was with them *Vitis nigra*, and the clematis was *Vitis alba*, probably from its white blossoms. The bryony is a dicecious plant, sometimes, as it is now known, becoming moncecious with age. "'Tis call'd virgin-vine," says Louis Liger d'Auxerre, "in regard it has never yet produced anything, and so is a virgin, as 'twere," alluding to its unisexual flowers. The origin of the name *Vitalba* is apparent, and its relation to the Virgin has probably followed from this early association with bryony. Another European species, *C. Flammula*, has retained as its specific appellation its original common name. *Flammula* was the name given to an acrid, burning species of *Ranunculus* (*R. Flammula*), and the acrid leaves of this species, with some resemblance in the foliage under some conditions, brought about the association. Another species, *Clematis Viorna*, has retained its original proper name, some supposing it to have been derived from "adorning the way;" but it may be simply "ornamental vine." *Viorne* is the French name of the *viburnum*, which in English is "wayfaring tree." Dr. Arnold Bromfield, in *Flora Vectensis*, notes that "the slender flexile branches [of *C. Vitalba*] served occasionally for binding faggots, and as a substitute for the more costly pipe or cigar to our young rustic smokers," and that with these the branches were known as "bedwine." "Pethwine" is, however, the correct vernacular. The Greek *klemata* is suggestive of the use of the branches for tying purposes.

The commonest American clematis in the Eastern portion of the continent is *C. Virginiana*, closely allied to the European "virgin's bower," but differing in having ternate instead of pinnate leaves; and, singularly enough, a species differing but slightly from this, and chiefly in narrower leaflets and sepals, is found in Japan. *C. ligusticifolia*, also nearly allied, takes the place of *C. Virginiana* in the Rocky Mountains and westward to the Pacific coast. China and Japan have several very ornamental species, and these have been the parents of many pretty forms in gardens, in some of which the flowers are double by the transformation of stamens to petals. *Clematis Japonica*, closely allied to our *C. Virginiana*, is known in this country as *Futs Kusa*. Shecut, an early botanist of South Carolina, notes in his *Botany* of that State: "The Spanish, or blistering, flies are very fond of *Clematis crispa* (a Southern species), and it would be well for medical gentlemen in the country to propagate the plant about their residences, in order to secure a constant succession of these valuable insects." Florists, however, find no necessity for such action, the blister-beetle being one of the most persistent of insect enemies. A species of Ægeria is also very destructive as a stemborer, and the roots are preyed on by a species of Anguillula, making them granulated, as Phylloxera does the roots of the grape. Besides this, a fungous disease often kills the plants as if by lightning. These enemies render clematis-culture no sure success in American gardens.

In regard to *Clematis Viorna*, Shecut says that a yellow dye may be extracted from both leaves and branches. The fibrous shoots may be converted into paper, and the wood is yellow, compact, and odoriferous, furnishing an excellent material for veneering. *Clematis Vitalba* is commonly known as German clematis in American gardens. In the time of Dodoens the German vernacular was *Lignen*. In modern times the Germans called it *Waldrebe*. The "ladies' bower of Virginia," of the early English herbalists, is the passion flower, *Passiflora incarnata*.

Clematises have generally no odor, but *C. Flammula* of Europe, and *C. coccinea* of the Southern part of the United States, are delightfully scented.

(T. M.)

CLÉMENCEAU, GEORGE BENJAMIN EUGÈNE, a French statesman, was born at Mouilleron-en-Pareds (Vendée), Sept. 28, 1841. He was educated at Nantes, and went to Paris to study medicine. There he associated with the young republicans and contributed political articles to various journals. Having thus become obnoxious to the imperial government, in 1865 he removed to the United States, where he settled at Hartford, Conn., and was soon after married to Miss Mary G. Plummer. In September, 1870, on the downfall of the Empire, he returned to Paris and established himself as a practising physician in Montmartre, in Paris. But he was almost immediately called to be mayor of the arrondissement, and during the subsequent siege of the city by the Germans was conspicuous for energy and administrative ability. In February, 1871, he was elected to the National Assembly for the department of the Seine.

On the uprising of the Commune in March, Clémenceau exerted himself to prevent bloodshed and to restore order, but the mob, suspecting him of being an agent of the national government, which was then organized under M. Thiers, thrust him from his office, and even sought his life. When the second siege of the city began, Clémenceau retired from the National Assembly to share the fortune of his fellow-citizens. Yet he continued his efforts for conciliation, and early in May went on a mission to other cities of France to endeavor to secure an immediate meeting of the newly-elected republican delegates in the interests of peace. Before his return the gates of Paris were closed, and the Commune movement was presently suppressed. Having returned to the Assembly, Clémenceau, in March, 1872, presented the draft of a law authorizing the election of a municipal council for Pa[illegible] On its passage he was elected in July to this co[illegible] and became in succession its secretary, vice-p[illegible] and president. In February, 1876, he was e[illegible] to the new Chamber of Deputies, where he was a [illegible]er of the extreme Left. In May, 1877, he to[illegible] famous protest of the 363 against the [illegible] the Assembly by the Duc de Broglie; and [illegible] Assembly was dissolved, in June, he was one of committee of eighteen which directed the [illegible] electoral campaign which ensued. In the str[illegible] publican Assembly thus elected Cl[illegible]nce [illegible] to proclaim bluntly his radical id[illegible] unsparingly the administration of [illegible] He was then a supporter of M. Gam[illegible] in character and manner widely dif[illegible] his personal friend. This was show[illegible] betta's second in his duel with M. vember, 1878. In January, 1879, president of France, and Gaml of the House. Clémenceau

ership of the extreme Left, and was active in carrying through the House the radical programme for the exclusion of the clergy from educational affairs, the expulsion of the Jesuits, and the amnesty of the communists who had been banished to New Caledonia. At this time it became evident that Gambetta, for the purpose of uniting firmly the people of France, had adopted the policy of opportunism, but Clémenceau remained stanch in his aggressive radicalism. He openly opposed the ministry of Jules Ferry, and when Gambetta became minister continued to wage a more vigorous policy. Since the death of Gambetta the followers of the latter have mostly joined in supporting M. Clémenceau.

CLEMENS, SAMUEL LANGHORNE, an American humorist, generally known by his assumed name, "Mark Twain," was born at Florida, Mo., Nov. 30, 1835. A few years later his father removed with his family to Hannibal, on the Mississippi River, where Samuel entered a printing-office. After learning the printer's trade he journeyed from town to town as far as New York; then, returning, found his way to New Orleans. He then resolved to become a Mississippi steamboat pilot, but scarcely had he become perfect in his knowledge of the navigation on that river when it was closed by the outbreak of the Rebellion. Then his brother, having been appointed lieutenant-governor of Nevada Territory, made Samuel his private secretary. The attractions of the mines soon allured him from this post, and for months he lived the rough life he afterward described so vividly. He next became local editor of a newspaper in Virginia City, and in connection with it began to use the name by which he is generally known. It is a familiar cry on the Mississippi steamboats, the man sounding the channel calling out "Mark twain" instead of "Mark two" (fathoms). In 1864, Clemens left Nevada and became connected with the San Francisco press, and afterward visited Southern California and the Sandwich Islands as a newspaper correspondent. Having acquired considerable reputation on the Pacific coast, he entered the lecture-field and came to the Eastern States. In 1867 he joined an excursion on a steamer to the shores of the Mediterranean, and the incidents of the trip furnished abundant material for his book, *The Innocents Abroad* (1868), which gave him a wide reputation as a humorist. His next book, *Roughing It* (1872), depicted with the same exuberance of humor the life on the Plains, while *Tom Sawyer* (1873) has generally been considered autobiographical to a great extent. *The Gilded Age* (1873), in the authorship of which he was associated with Charles Dudley Warner, was a burlesque on the American tendency to speculation and extravagance. In *The Prince and the Pauper* (1878) Mr. Clemens attempted with less success to portray English life in the seventeenth century. *His Life on the Mississippi* (1874; revised ed. 1883) is a graphic account of the occupation to which he devoted some years of his youth. His travels in Europe in 1878 have been humorously depicted in *A Tramp Abroad* (1880). More recently have appeared *The Adventures of Huckleberry Finn*, a sequel to *Tom Sawyer*; and *A Yankee at King Arthur's Court* (1889). In 1884 with others he established in New York the publishing house of C. L. [illegible] Co.

(J. P. L.)

[illegible] (1785–1869), an American in- dumb, was born at La Balme, 1785. While an infant head and face, and of smell and hearing. When twelve years old he was placed in the celebrated school for the deaf and dumb in Paris under the direction of the abbé Sicard. He was a favorite pupil, and in 1805 he began to give instruction to others. In 1806 he was regularly employed in the institution, and a few years later he taught the highest class. In 1815, while on a visit to England, he met Rev. T. H. Gallaudet, D. D., of Hartford, Conn., who had gone to Europe to acquire the art of training deaf-mutes. Mr. Clerc was induced to accompany Dr. Gallaudet to the United States. He arrived August 22, 1816, and immediately took part in organizing the Connecticut Asylum for the Education of the Deaf and Dumb. (See DEAF, EDUCATION OF THE.) Mr. Clerc was married in 1819 to Miss Boardman, a deaf-mute and a pupil in the Hartford asylum. Their children all speak and hear. In 1858, Mr. Clerc, after having been engaged in teaching with great success for fifty years, retired on a pension. He died at Hartford, Conn., July 18, 1869.

CLEVELAND, CHARLES DEXTER, LL.D. (1802–1869), an American educator and author, was born at Salem, Mass., Dec. 3, 1802. His father was a merchant, who in his sixtieth year entered the ministry of the Congregationalist order, and served for nearly forty years as city missionary in Boston. From the age of sixteen until he was twenty-one the son was engaged in mercantile business, but then went to Dartmouth College, where he graduated in 1827. While a student he published the *Moral Characters of Theophrastus, with a Translation and Notes* (1826). In 1830 he was appointed professor of Latin and Greek in Dickinson College and while in that position published a *Compendium of Grecian Antiquities* and some other school-books. In 1832 he became professor of the Latin language and literature in the New York University, and in 1834 he removed to Philadelphia, where he opened a school of a high order for the instruction of young ladies. This he maintained with unvarying success for nearly thirty years, when he was compelled on account of failing health to relinquish it. During all this time he was also engaged in literary work, and published a *Compendium of English Literature from John Mandeville to Cowper* (1848), *Compendium of English Literature of the Nineteenth Century* (1851), *Compendium of American Literature* (1858), *Compendium of Classical Literature* (1865). The selections in these text-books were made with good judgment, and the biographical and critical notes were carefully prepared. Mr. Cleveland also made a collection of American hymns under the name *Lyra Sacra Americana*, and published a *Critical Edition of Milton, with Notes, Life, and a Complete Verbal Index* (1853). He was always an earnest opponent of slavery, and in 1844 wrote the "Address of the Liberty Party to the People of Pennsylvania." Occasionally the selections and notes in his compendiums show how strongly he felt on this subject. After he had closed his school he was in 1861, without solicitation, appointed by Pres. Lincoln United States consul at Cardiff, Wales. He returned to Philadelphia in 1867, but by the advice of his physician soon went to reside in England. In the summer of 1869 he again visited Philadelphia, and died there suddenly, Aug. 18, 1869.

CLEVELAND, GROVER, an American statesman, was born at Caldwell, Essex Co., N. J., March 18, 1837. His father, Richard F. Cleveland, was a Presbyterian minister, who afterward removed to the State of New York, and died at Holland Patent in 1853. Grover then became a teacher in the New York Insti-

tution for the Blind. In 1855 he set out for Cleveland, O., with the intention of studying law, but while passing through Buffalo was induced by his uncle, L. F. Allen, to remain in that city. He was admitted to the bar in 1859, and in January, 1863, was appointed assistant district attorney for Erie county, which position he held three years. In 1870 he was elected sheriff of the county, and on the expiration of his term he resumed the practice of his profession. In 1881 he was elected mayor of Buffalo, and his faithful discharge of this office drew attention to his executive ability. In the next year the Democrats nominated him for governor of New York, while the Republican candidate was Hon. C. J. Folger. There was, however, serious dissension among the Republicans, and Cleveland was elected by the unprecedented majority of 192,854. While he was governor, the frequency of his vetoes, especially those concerning railroads, was notable. Questions relating to the condition of labor and municipal government were fully discussed in his messages. The Democratic National Convention at Chicago, in 1884, nominated Cleveland for president. The Democratic electoral vote was 219, and that of Blaine, the Republican candidate, 182. Cleveland, in his presidency, had to encounter the tremendous difficulty of carrying out civil service reform, since his party had been excluded from national office for 24 years. Although he struggled bravely to maintain that principle, the strong pressure of office-seekers forced him often to give way. The condition of the national finances also became a pressing question. To reduce the surplus which was accumulating in the U. S. Treasury, the majority of the Democrats urged a revision of the tariff. Cleveland supported their efforts, and after the failure of a bill for this purpose in 1886–87, devoted his entire message in December, 1887, to the subject. The Mills bill, prepared accordingly, passed the House but failed in the Senate. Cleveland was unanimously renominated by the Democratic Convention at St. Louis, in July, 1888. The contest turned entirely upon the issue presented by him and was decided in favor of protection. Cleveland obtained 168 electoral votes out of a total of 401. In his last message, Dec., 1888, he reiterated his views on tariff reform, and after his retirement, undismayed by defeat, continued his "campaign of education." He became the oracle of the Democratic party and his utterances in exposition of its principles received marked attention from the people. His courage was shown in his resolute adherence to the conservative position he had taken on the silver question when president-elect. In 1891, when a bill for unlimited free coinage was pressed upon Congress by a large mass of the Democratic party and by the Western States generally, Mr. Cleveland pronounced the bill a reckless financial experiment. Yet even such bold rebuke of the wishes of the masses has had little perceptible effect on his leadership.

CLEVELAND, the county-seat of Cuyahoga co., Ohio, is at the mouth of the Cuyahoga River, on the southern shore of Lake Erie. It is the largest city in Ohio except Cincinnati. By rail it is 606 miles W. of New York, and 356 miles E. of Chicago. There are a dozen railroads, including local branches, and besides the Union Depot, three smaller depots. There are also daily steamboat lines to Detroit and the ports of Lake Superior, whence iron ore and copper are brought. These being met at Cleveland by the bituminous coal of the Mahoning and other valleys, give Cleveland its manufacturing prosperity. The leading manufactures are those of iron, and they have been developed in an endless variety, from heavy castings to surgeons' needle-injectors. Rolling-mills, Bessemer steel-works, wire-mills, car-wheel works, and tube-mills form only a partial list of the establishments of this class. The other leading articles of manufacture are acids, ale, barrels, baskets, boots and shoes, bridges, cars, carpets, carriages, cigars, fences, files, flour, furniture, lawn-mowers, leather, mill-furnishings, organs, paints, paper, paper boxes, pottery, powder, sashes and blinds, saws, screws, sewing-machines, ships (wooden), shirts, soap, steam-engines, stoves, tools of all kinds, trunks, varnishes, vinegar, washing-machines, white lead, wines, and wooden ware. Two notable industries located in Cleveland are the Standard Oil Company and the Brush Electric Light Company. There are 48 hotels, 6 national banks, 8 private banking-houses, and 3 savings banks. The newspapers and periodicals published here are classed as follows: daily, 9; tri-weekly, 2; weekly, 28; semi-monthly, 2; monthly, 19; quarterly, 1. The following is the number of the churches: Baptist, 10; Bible Christian, 2; Roman Catholic, 18; Christian, 3; Congregational, 9; Evangelical, 16; Friends, 1; Jewish, 5; Methodist, 18; Presbyterian, 10; Episcopal, 13; Reformed, 8; Swedenborgian, 1; Spiritualist, 2; United Brethren, 2; Universalist, 1; miscellaneous, 29—total, 148. The public schools of Cleveland received the first prize at the Centennial Exhibition at Philadelphia in 1876. The board of education consists of one member from each of the eighteen wards. A superintendent of instruction has the special charge of the schools, assisted by a special superintendent of primary instruction, a supervising principal of the German department, and teachers of music, drawing, and writing. The higher branches are taught in two high schools and a normal school. The public schools are divided into two districts, each with a supervising principal. The first district contains 25 schools, for the most part in large "union school" buildings; the second district contains 14 schools. The Roman Catholics have 4 convents and a large number of parochial schools. There are also a number of private educational institutions, several of which are devoted to the teaching of young ladies. The Case School of Applied Science has a liberal foundation. The Western Reserve College, formerly at Hudson, Ohio, where it was founded in 1826, was removed to Cleveland in 1882 at the instance of a wealthy citizen, who erected new buildings and furnished an ample endowment, so that it has become the Western Reserve University. The city is divided into eighteen wards, each of which sends two trustees to the common council. The police and fire departments are under separate boards of commissioners. Thirteen steam-engines, 5 hook-and-ladder companies, and a telegraphic alarm are the city's defence against fire. The park commissioners have charge of the new Lakeside Park, which extends along the terraced slope of the lake for nearly a mile. They also have the care of Wade Park, a magnificent tract of land near the eastern limits of the city. Aside from the cemeteries that belong to the corporation, a new one, called "Lake View," has been recently laid out on the edge of a hill overlooking the city and just outside of its eastern borders. In this spot repose the remains of Pres. Garfield, and his monument is to be erected here at a cost of $250,000. Among the recent improvements, besides the enlargement of the U. S. Government building and the erection of many handsome business blocks, is the viaduct of stone and iron

the chasm through which the Cuyahoga
This immense structure unites the east
es of the river by a broad street at a height
75 ft above the water-level, the cost having been
1,250,000. An extensive breakwater off the harbor
rves to protect the shipping from the storms to which
Erie is the more liable because it is the most
of all the great lakes. By the annexation of
burg, Cleveland has taken within its limits the
orthern Ohio Insane Asylum. The city is noted for
large number of benevolent societies and so ial
ns that are maintained, a special feature being the
erman singing societies.

Cleveland was first settled in 1796 by the Connecticut
and Company, and named in honor of Moses Cleve-
nd, who had charge of the survey. But the first
ent settlement was in 1800. Ohio City was
d in 1855, and East Cleveland and Newburg in
and 1873. The decennial censuses have given the
tion as follows: 1810, 57; 1820, 350; 1830,
, 1840, 6071; 1850, 17,034; 1860, 43,417; 1870,
18; 1880, 160,146; 1890, 261,546.

CLIENT, the person who employs an attorney, bar-
counsellor, solicitor, proctor, or other member
legal profession, either to prosecute or defend a
for him, or to advise him with reference to legal
ers. The name has its origin in the *clientes* of
n days, of which each *patronus* had a large fol-
It was the duty of the *patronus* to relieve the
of his *clientes*, to appear for them in court, and
d the law to them in doubtful cases. As a
e the *clientes* were bound to be heartily duti-
obedient to their *patronus*, to promote his
to pay his mulcts and fines, to aid in discharg-
portioning his daughters, etc., etc. In
s of the Roman Empire the relation of
seems to have entirely disappeared.
d advocates, called *statuti* or *supernumerarii*, per-
ed the duties of the *patronus*. Their employers,
continued to be known as *clientes*.

m was imported into the English law at a
ly date, and it is believed is in universal use
in England and in the United States. The
of a client with regard to the attorney employed
are rigidly enforced by the law. All communi-
taking place between them are regarded as
and as to them the attorney's lips are sealed.
cannot be compelled, but will not be per-
to give testimony in reference to them in a
where the interest of the client may be
cted by his so doing.
ys fail to pay over moneys collected
of their client the court will by sum-
compel such payment, frequently going
of disbarring the delinquent for breach
ial duty.
ient" is also sometimes used loosely to
persons employing practitioners of learned
ther than the law. (L. L., JR.)

CLIFF-DWELLINGS, a name applied to human
bodes
er constructed upon shelves or terraces on
cliffs or precipices, or excavated, wholly or
the rocky walls of cliffs and cañons. Such
now mostly abandoned, are found in various
New Mexico, Southern Utah, and Arizona,
South-western Colorado, as well as in Northern
That their former inhabitants were in some
(either as ancestors or as the kindred of
some one or more of the various races of
so-called Pueblo Indians may be taken for granted, since the civilization of the cliff-dwellers was in many respects identical with that of the Pueblos of to-day. In some respects the cliff-dweller seems to have been better off than his modern representative: the cañon walls gave his habitation a shelter from the severe storms, and overhanging shelves of rock often protected the house from any attack from above. Many of the pueblos now inhabited are, in some sense, composed of cliff-dwellings. The town of Acoma, New Mexico, for example, is perched upon a lofty rock, and is with some difficulty accessible by only two narrow paths. But the true cliff-dwellings are in many instances built on ledges and shelves which it is almost impossible to reach. The dwellings vary in size with the space upon which building was practicable. In some instances the houses are immense structures three or four stories high, and are divided into many small apartments, in every respect resembling the great communal dwellings which still compose some of the principal inhabited pueblos. Often the rock in the rear of the building is hollowed out into a cave. The walls are usually of stone, often rough, sometimes squared; but some of the dwellings are of adobe. Stone watch-towers are usually found near at hand, and the presence of ruins on the cultivable bottom-lands of the cañons may indicate that the cliff-houses were sometimes places of refuge in time of attack, rather than ordinary habitations. In some examples the outer wall of the cliff-house is so finished as to be scarcely distinguishable from the face of the neighboring cliff. Early in 1884 the discovery was reported of a series of cliff-villages lining the walls of Walnut Cañon in North-eastern Arizona, the series extending for five miles or more. This locality is interesting from the great number of domestic utensils there found, but access to the houses is very difficult. Fifteen miles away is an interesting cave-town, with at least sixty-five remarkable subterranean dwellings, long since abandoned, and rich in domestic implements and ornaments. The cave-houses are apparently artificial, being excavated in the crest of certain volcanic hills. Among the more remarkable cliff-dwellings are those of the Cañon de Chelle and the cañons of the Diamond Creek, Rio Mancos, La Plata, and San Juan, South-western Colorado being the region where the greater number of these remarkable structures have thus far been found. (An illustration of one of these buildings is given in the article on AMERICAN ARCHÆOLOGY, vol. i. p. 279.) Some of the cliff-dwellings were still inhabited when the Spaniards first invaded this region. Atitlan, in Central America, was a cliff-city when the Spaniards first captured it.

In the Old World cliff-dwellings are by no means unknown. Perhaps the most remarkable of which we have any account are those of the island of Thera (Santorini), in the Greek archipelago. This island forms a large part of the rim of a submarine volcanic crater which has been active within the historic period. The inner basin, sheltered by the islands of Thera, Therasia, and Aspronisi, and including several islets, is walled about by high volcanic cliffs. At the northern extremity of this inner wall, on the cliffs of Thera, is the town of Epanomeria, which consists of tier above tier of houses, partly built on shelves on the cliff's face and partly excavated in the volcanic rock. The lowest range of houses is said to be four hundred feet above the sea, and the highest is so near the top of the cliff that the chimneys in some cases reach

up through the soil above. In some places the houses are piled up fifteen or twenty deep. A zigzag road and stairways give access to the houses. Other towns of the island have somewhat of the same general features. The famous ruined city of Petra and its environs afford examples of cliff-dwellings, and the terraced slopes of Assos should also be noticed. The case of Acoma and the other mesa-built towns of the Pueblo Indians is more than paralleled by that of Albinen, a town of the Swiss canton of Valais, built upon a high mountain and accessible only by means of a succession of eight perpendicular wooden ladders. It is probable that some of the ruined and now inaccessible cañon-houses of the South-west were once reached by ladders and stairways long since destroyed. In the island of Minorca there is a prehistoric cañon-town quite in the general style of the abandoned New Mexican cliff cities.

(C. W. G.)

CLIFFORD, William Kingdon, F. R. S. (1845–1879), an English mathematical and philosophical genius, was born at Exeter, May 4, 1845. He was educated in his native town till 1850, when he went to King's College, London. There he displayed rare mathematical talent, and also distinguished himself in classics, history, and English literature. Entering Trinity College, Cambridge, in 1863, though he could not be induced to confine himself to the regular course of study, he maintained his high reputation as a mathematician, and on graduating, in 1867, was second wrangler. He was elected fellow of his college, and in 1870 took part in the English expedition to the Mediterranean to observe the solar eclipse. In the next year he was made professor of applied mathematics at University College, London, and in 1874 was elected a Fellow of the Royal Society. His constitution was weak, and, though at college he was proficient in gymnastics, his mental activity and delight in intellectual labor led him to neglect the care of his health. In 1876, being compelled to go abroad, he spent the summer in Spain and Algiers. He returned to his work with renewed zeal, but in April, 1878, was again obliged to go south. He died in Madeira, March 3, 1879. He was a most brilliant lecturer, being able to render the most abstruse subjects clear and intelligible. At college he had been an extreme High Churchman, but he afterward became a follower of Darwin, and then of Herbert Spencer. In his lectures and in various articles in the *Reviews* he discussed scientific, philosophical, and metaphysical subjects with such clearness, brilliancy, and profundity as to excite the highest anticipations of discoveries to be made by him. He had published a volume called *Seeing and Thinking*, and after his death his *Lectures and Essays* (1879) were published with a biographical introduction.

CLIFTON SPRINGS, a village and health-resort in Ontario co., New York, in the townships of Phelps and Manchester, and on the Auburn branch of the New York Central Railroad, 11 miles E. N. E. of Canandaigua. It is chiefly known for its calcic sulphur waters, useful in many cases of rheumatism and catarrhal and skin disease, and in certain nephritic and vesical complications. Another spring is highly charged with carbonic acid. The village has a union school, a seminary, a newspaper, four churches, and a large sanitarium connected with the springs.

CLIMATE. The primary cause of terrestrial climatic variations is the influence of the solar rays on the earth's surface; the secondary causes are the annual and diurnal revolutions of the earth and the complex conditions of its surface. The variations of climate, multiform as they are, are gradually being brought within the domain of science and shown to be governed by general laws, of which it is here proposed to give a brief explication. If the surface of the earth were covered with a uniform ocean, the problem of climate would be greatly simplified. Certain fixed conditions would then rule which now only rule in part, since they are disturbed by the influence of the land-surface. That we may properly understand the problem of climate, it is necessary first to detail these conditions, and afterward to consider the disturbing effects of the land-surface.

Let us, then, imagine the earth to be—as it probably once was—covered with a general ocean, and above this the gaseous atmosphere. Upon the equatorial surface of the rotating sphere the solar heat falls vertically, and obliquely on the regions toward the poles. Hence the direct effect of the solar heat steadily decreases north and south from the equatorial zone, and reaches its minimum at the poles. But this zone is of considerable breadth, since the vertical sun moves twice annually over a zonal region of 47° in width, with the equator for its median line. Thus the temperature at any point must vary from a maximum degree in the summer to a minimum degree in the winter of either hemisphere. But this direct distribution of temperature is disturbed by other causes—namely, the movements of the heated air and water. A primary disturbing influence is the evaporation of water, in consequence of which the air becomes saturated with moisture. This greatly decreases its transparency to the solar rays and cuts off much of the descending heat. On the other hand, it prevents the ready escape by radiation of such heat as penetrates to the surface. This heat is partly absorbed by the surface and only gradually yielded to the air, so as to preserve some uniformity of temperature. In the most conductive soils the direct heating effect of the solar rays is felt to a depth of 4 feet. In water it has been traced to a depth of 500 feet.

Important consequences arise from the warming of the surface-layers of air and water. The warm ocean-water of the tropics expands and rises. In the frigid zones the water is condensed by cold and contracts. Thus an inequality of level is produced, and a flow of water from the equator toward the poles takes place to restore the equilibrium. As a result of this outflow, the water-pressure in the tropical zone is reduced and that in the frigid zones is increased. In consequence, the heavy water from the polar regions flows toward the equator along the ocean-bottom to restore the equilibrium of pressure. Such a revolution of the ocean waters is in constant operation. Were there a general ocean, it would be perfectly regular, instead of irregular as now. Its effect upon climate is to carry the warm water of the tropics far to the north and south, and thus considerably to increase the temperature of these regions. To gain an idea of the modifying influence of the great ocean-currents on temperature, we may adduce the calculation of Prof. Croll, who estimates that if the Gulf Stream were removed the temperature of the North Atlantic would be reduced to 3° below zero. This movement of the waters, however, is not due north and south; the axial rotation of the earth gives it a set toward the east. It moves from the equator, where the earth's surface is rotating eastward with a speed of 1000 miles per hour, to regions where the speed is much less. Thus, when

reach the temperate zones, they motion easterly. They form cur- north-easterly and south-easterly, and and more to the east as they reach the where the speed of the earth's sur- greatly reduced.

oceanic revolution is paralleled by a somewhat revolution in the atmosphere. The heated air orrid zone expands and rises in a strong upward The atmospheric pressure is reduced, and a of air sets in from north and south to restore the rium of pressure. But this movement disturbs equilibrium of pressure in the upper atmosphere, upper current moves from the superabundant tropics to restore the air taken from the tem- frigid regions by the surface-currents to- equator. These surface-winds are affected earth's rotation in the same manner as are the rents. Their original speed of rotation is less of the equatorial region; hence they lag back rly set. They form the north-east and -winds. Reaching the torrid zone, they t due west, while between them is a zone d variable winds, the zone of ascending air. pper currents of winds, or anti-trades, blowing gradually descend toward the earth's surface, reach in the latitude of 35° or 40°, north Their downward pressure produces in this zones of high atmospheric pressure, which, equatorial zone, are regions of calms and vari- nds. They form in the North Atlantic the f calms and baffling winds designated by sail- he "horse latitudes." From these zones part ding air turns toward the equator to feed -winds. Part of it continues to move in its direction, and forms winds blowing with a trend toward the poles, its influence extend- up into the frigid zones, which are also areas w atmospheric pressure.

een these regular revolutions of air and water are tain important differences. The heat of water-currents is given to the air and to dify the temperature of the extra- ne heat of the upper atmospheric radiated to space and lost to the earth. peculiar action of the air depends upon its -containing powers. These increase very rap- increase of temperature. Air at 32° F. can its weight of transparent vapor. At 59° it $\frac{1}{100}$, and at 86° $\frac{1}{70}$, its weight, its capacity with every 27° of temperature-increase. Satu- air at 80° holds 10.81 grains of water per cubic at 60° it holds 5.87. Hence air chilled from 80° loses much of its vapor-containing power, and ow down as rain about 5 grains of water from foot. This is the main cause of rains—a the air, and partial loss of its capacity for por.

he air of the tropics, warmed and expanded by the r rays, gains a high saturation-capacity and absorbs e stores of evaporated ocean-water. Ascending into upper regions of the atmosphere, it becomes led and is forced to discharge much of its water- or in the form of rain. To this cause must be at- uted the prevailing rains of the equatorial belt. In belts of high pressure in the temperate zones, at north and south limits of the trade-winds, the osite conditions exist. The air is below its satura- tion-point and rain not likely to occur, except from local causes. In the Sargasso Sea of the Atlantic, which is crossed by the northern belt of high pressure, clear skies and bright and sunny weather prevail, with occasional squalls.

The regularity of climatic conditions which would result from these causes, were there a uniform ocean-surface, is disturbed by the influence of the land-surface. We may briefly point out the interference with the regular movements of air and water which is produced by the land-distribution. In the first place, the great mass of the land exists in the northern hemisphere. It is in some way due to this that the southern trade-winds surpass the northern in tropical vigor, blowing, in the Atlantic, across the equator and to 3° north latitude, while the northern trades die out at 7° north latitude. (These limits, of course, vary as the sun moves north or south.) In regard to the movements of the ocean-waters, the broad expanse of sea in the southern hemisphere permits a general southward trend but little broken into currents. In the northern hemisphere, on the contrary, the oceans are contracted in area, and their westward-setting tropical waters are heaped against the eastern coasts of the continents and forced to flow north in narrow and deep streams of warm water. These, deflected eastward in the temperate zone, and the warmth which they communicate to the air carried eastward by the anti-trades, greatly mitigate the temperature of the western sides of the continental masses, and give to Europe and Western America a far higher temperature than prevails in the same latitudes in Asia and Eastern America.

Another effect produced by the land is an irregularity in the distribution and precipitation of aërial vapor. Only the winds which blow over the ocean-surface become saturated with vapor. Those which blow over the land fail to gain new vapor and gradually lose what they have; so that in the interior of continents the winds become more and more dry, and the portions of wide continents most distant from the ocean crossed by the prevailing winds are apt to become desert regions, through lack of rain. This result is greatly influenced by the degree of elevation of the land. A range of hills lying in the path of the winds acts to drain them of their moisture. The hills are usually colder than the air which impinges on them, and thus cause condensation. They also force the moving air upward into rarer regions of the atmosphere, where it expands and chills. By both these causes considerable precipitation is produced, and the winds are dried. Another result of precipitation is an increase of temperature. The gaseous vapor becomes condensed to a liquid and gives out its latent heat, which warms the air. At the same time the gathering clouds check radiation and act to retain and render uniform the terrestrial heat.

In regard to the direction of the winds, continental masses exert important influences. In fact, all masses of land affect the winds, causing special inflows and outflows of air. But with small masses this effect is irregular and fluctuating; with large masses it becomes regular. The general movements of the air are decidedly affected by the larger continental masses, such as Asia and North America. These great bodies of land are subject to special heatings by the solar rays in summer and special chillings in winter, and thus act as secondary centres of atmospheric disturbance. They

produce local regions of high and low pressure, which cause special winds and important modifications in the distribution of rain.

Modern meteorological study has revealed one important fact. All winds are due to a single cause—the natural flow of air from regions of high to regions of low atmospheric pressure. The air removes from points where it is in excess to points where it is deficient, to restore the equilibrium of quantity. Probably in all such cases a similar but reverse movement take place in the upper atmosphere. The changes of atmospheric pressure to which winds are due are indicated by the variations of the barometer, which has thus become the all-essential measuring-rod of modern meteorology.

In the greater continents wind-producing influences exist little less regular and persistent than those which produce the trades. In summer the atmospheric pressure is lowest in the central regions of the continents of Asia, Africa, and America, and relatively highest in the Atlantic between Africa and the United States, and in the Pacific between Asia and the United States. Thus persistent winds set in from the oceans toward the centres of these continents. In winter the opposite conditions exist; the lowest pressures are in the North Atlantic and Pacific, where the temperature is relatively the highest. The highest pressures are in the central regions of the continents, where the temperature is abnormally low. In consequence, there is a steady outflow of air from these central regions toward the low-pressure regions of the oceans. These differences of condition are more marked in Asia than in the other continents, and there produce effects of the greatest importance. Persistent winds, known as "monsoons," blow regularly in from the neighboring oceans toward the region of Central Asia from April to October. These ocean-winds bring with them abundant moisture, which is shed in torrents of rain on the Coromandel coast and on the mountain-regions of Hindostan. In winter, from October to April, the conditions change; high pressure prevails on the continent and relatively low pressure on the ocean. The winds blow steadily southward from the continent, forming the north-east monsoons, which are dry winds, and bring persistently clear weather. At the period of change of the monsoons storms of extreme violence occasionally arise in the eastern seas.

Winds resembling the monsoons prevail on the coasts of Africa, South America, and Australia, with the like effect of raising the rainfall to its maximum in the summer of these continents. Other important effects, arising from the same general cause in its local applications, are the daily and nightly sea- and land-breezes which prevail on the coasts of the warmer climates, and greatly mitigate the severity of this heat. In North America the main centre of atmospheric disturbance appears to be in Utah and the surrounding States. In this region the pressure is abnormally low in summer, and the winds blow in from all directions. In winter there are two regions of high pressure, one around Utah, the other in the South-eastern States. Between them is a trough of low pressure extending from Chicago to South-western Texas. From these regions of high pressure the winds blow out toward the low-pressure trough, or toward the Atlantic. In the United States, as a whole, the prevailing winds in winter are north-west, and these frequently cause a sudden and great fall in the temperature and bring with them violent storms.

In addition to these far-extending and regular movements of the air, caused by the influences of great bodies of land and water on the atmosphere, there are other movements, more localized and irregular, of great interest and importance. The widespread variations of atmospheric pressure, with their fixed zones or centres, are paralleled by minor variations of frequent occurrence, and usually distinguished by the migratory character of their centres. To such variations, in which there is a contracted area of low pressure surrounded by a wide zone of high pressure, are due the cyclones, or great spiral storms, which have of late years attracted so much attention. The causes of these fluctuations of pressure are not known. The most violent of those which occur on the American coast seem to have some connection with the warmer regions of the Gulf Stream, though no explanation has been offered of the cause of their rapid movement northward.

The movements of the air in a cyclone are in harmony with its more general movements. The centre of the cyclone is a region of low pressure and of ascending air; its exterior is a zone of high pressure and of descending air. The excess of air in this outer zone flows toward the centre, to supply the deficiency there existing. But the winds thus occasioned do not move directly, but spirally toward the centre; the result is a great whirling motion in the air, the deflection being toward the right in the northern hemisphere, through the influence of the earth's axial rotation. All great wind-storms tend to assume this cyclonic character, the direction of the wind being at an angle of 60° to 80° from a right line to the centre. The centre is a region of calm. The air which whirls round it, starting in gentle winds from the high-pressure region, increases in violence inwardly, and becomes a severe gale as the centre is approached. The whole motion is supposed to be a descending one in the anti-cyclone or high-pressure zone, then a horizontal spiral whirl, increasing in violence as its diameter is lessened, then an ascending movement near the centre of the whirl. This is apt to be a point of severe rain, from the chilling of the ascending air. The inward pressure of the wind from various directions necessarily causes a calm at the centre, precisely as the opposite movements of the north-east and south-east trade-winds cause a central zone of calms. The two cases, indeed, are otherwise parallel. At the high-pressure zone of the anti-trades the air descends, blows toward the equator, and there ascends. The cyclonic whirl cannot be imitated by the trade-winds, since they blow toward a zone, not to a centre of low pressure. Wherever the low pressure occupies an extended line, there can be no cyclone. Where it occupies a localized centre, the wind always approaches in a cyclonic whirl.

Of the cyclones which visit the United States, the most vigorous originate in the region of the West Indies and move north-eastward along the Atlantic coast of the continent, where they produce heavy easterly gales; they are finally lost in the North Atlantic, but may occasionally reach Iceland and Great Britain. In less frequent instances they pass northward from the Gulf along the Mississippi Valley, and thence north-eastward to Maine. Their origin is in the southern limit of the north-east trades, and may be partly or wholly due to the heat and humidity of the Gulf Stream current.

The United States is visited by other cyclonic movements of less violence and moving from other regions

In addition to these, there occur more localized storms of different origin, and often of extreme violence; these are known as "tornadoes" and "whirlwinds." They are ascribed to vertical, as cyclones are to horizontal, variations of atmospheric pressure. They arise from an abnormal vertical diminution of atmospheric heat and moisture. Tornadoes are much more violent than cyclones. The air which is drawn up in the centre of the whirl, being of high temperature and near saturation, becomes suddenly chilled through expansion, and a rainfall of extreme violence is apt to follow.

Such are the general causes and features of climatic variation in different regions of the globe; there are other more special causes, which we have not space to describe. The influence of the polar ice-cap in chilling the air is one of these. Other less regular causes are the chilling influence of great snowfalls and of floating icebergs. The height and direction of mountain-ranges, the width and elevation of table-lands, the existence of broad sea-level plains or of great sandy deserts whose dry air permits an abnormally rapid heating and cooling, the influence of atmospheric electricity, and numerous other slighter causes, influence climate and give it that rapid variability and frequent great difference in similar latitudes which would not exist were the earth's surface uniform in level and condition. The whole problem of climate is yet far from solution, and a much fuller series of facts is requisite. This the daily observations of the signal stations, now made at many widely-separated regions of the earth, promise to give, and there is reason to hope that in the near future a degree of scientific certainty may replace the largely empirical deductions of modern climatology. (C. M.)

CLINTON, CHARLES (1690–1773), the founder of the Clinton family in New York, was born in Longford co., Ireland, in 1690. His grandfather, William Clinton, was an officer in the army of Charles I., and after the execution of the king took refuge in the north of Ireland. James, his son, married Elizabeth Smith, whose father had been a captain in the Parliamentary army. Charles, their son, being a man of some influence and an elder in the Presbyterian Church, gathered a company for the purpose of settling in America, chartered a ship, and sailed for Philadelphia, May 20, 1729. On the voyage the captain of the vessel tried to starve the emigrants, so as to gain possession of their property, but finally landed them at Cape Cod, where many of them died. In 1731, Clinton purchased a tract in Ulster county, about sixty miles north of New York City, where they made a permanent settlement. He built a house surrounded with a palisade to protect it from the Indians. Besides attending to his farm, Clinton acted as land-surveyor, and was made judge of the county court. In 1756 he was lieutenant-colonel in Bradstreet's expedition against Fort Frontenac (now Kingston), Canada, his sons James and George serving with him. He died Nov. 19, 1773.

CLINTON, DE WITT, LL.D. (1769–1828), governor of New York, was the son of Gen. James Clinton and Mary De Witt, and was born at Little Britain, N. Y., March 2, 1769. He was educated by Mr. John Addison at an academy at Kingston, and after the Revolutionary war entered the junior class at Columbia College. This institution, formerly called King's College, had just been revived, and in 1786, De Witt Clinton was its first graduate under its new name. He was a diligent student, and in later life bore grateful testimony to the labors of Professors Cochran, Kemp, and Moore (afterwards Bishop Moore), under whom the college began its new course. He studied law, and was admitted to the bar in New York City in 1788.

See Vol. VI. p. 8 Am. ed. (p. 7 Edin. ed.).

As the question of the adoption of the Federal Constitution was then hotly discussed, young Clinton had an opportunity of displaying his talents as a political writer, and some letters signed "A Countryman," in which he opposed the arguments of Jay, Hamilton, and Madison in favor of the proposed Constitution, caused him to be regarded as a champion of the anti-Federal party. He became private secretary to his uncle, Gov. George Clinton, and remained in that position till 1795, when Gov. Clinton retired from office. He was elected a member of the State assembly in 1797, and in the next year a State senator. He strongly opposed the measures of President Adams's administration, and especially its hostility to France, yet when war was imminent he raised and equipped an artillery company. In 1800 the Republican party regained its power, but Mr. Jay remained in office as governor. His council, according to the constitution, consisted of one senator from each district, chosen by the assembly. The governor heretofore had enjoyed an exclusive right to nominate to office, allowing the council the right to confirm or reject. In 1801, De Witt Clinton became a member of council, and claimed the right of nomination for each member of the council. The same proposal had been made when his uncle was governor, and was successfully resisted, but now Gov. Jay, though opposing it, submitted the matter to the legislature, which body referred it to a convention of the people; and here, by the influence of the Republicans, the constitution was amended so as to secure Clinton's object. Yet his success at this time, by increasing party hostility, did much to embitter his subsequent political life. Clinton labored to improve the laws of his State, introducing sanitary regulations, fostering the arts and sciences, promoting agriculture, and stimulating the effort to apply steam for the purpose of navigation. His enthusiasm in behalf of these objects was frequently ridiculed by his political opponents, but the people learned to esteem him as one who used power for public good.

In 1801 he entered the Senate of the United States, where he maintained the high reputation he had already secured in his native State. Two years later he resigned his place to become mayor of the city of New York, being appointed by Gov. Clinton and a Republican council. In twelve years, owing to the changes of party ascendency, he was twice removed and twice restored to this position, then considered one of the most important in the United States. The mayor was president of the city council, head of the police, and had important judicial functions. Clinton was also State senator part of the time, and was lieutenant-governor of the State from 1811 to 1813. He had now become the most prominent Republican in the Empire State, yet so fierce were the attacks made upon him by the Federalists, and so moderate were his own views, that he lost favor with both parties. Madison had been selected for President in 1808, owing to Jefferson's partiality, and when his first term drew to a close, De Witt Clinton received the support of the Federal party, but obtained only 89 electoral votes to 128 for Madison. This defeat caused him also to lose his position as lieutenant-governor of New York. He was

still mayor of the city of New York, and by his liberal culture and wide sympathies did much to direct and harmonize the various movements which were then making that city the metropolis of the New World. He was an active promoter of free schools, of charitable institutions, of various literary and scientific societies. His chief publications were letters and addresses in connection with these. He was from 1810 to 1820 successively vice-president and president of the New York Historical Society, and promoted its interest not only by personal labor, but by securing a grant from the State.

From an early period Clinton had been an advocate of the project of connecting Lake Erie with the tidewater of the Hudson, and in 1810 was one of the commissioners to explore the wilderness through which the proposed canal must pass. In 1812, in company with Gouverneur Morris, he laid this matter before the Government at Washington, and requested aid for it as a national measure; but President Madison pronounced the undertaking too great for the resources of the entire Union. The war with England prevented anything more being done in the matter at that time, but when, in 1815, Clinton was removed from the office of mayor by the Republican council, he retired to prepare a memorial and argument in favor of the immediate construction of the Erie and Champlain canals. Having been adopted by a public meeting of citizens of New York, and enthusiastically approved by towns in the interior of the State, it was presented to the legislature. The Republican majority treated the scheme coldly, yet several commissioners were appointed to make the necessary surveys, to solicit grants, and report at the next session. Gov. Daniel D. Tompkins was at this juncture called to be Vice-President of the United States, upon which the people, without regard to party, elected Clinton to fill his place, and on July 4, 1817, he broke the ground for the great enterprise he had so zealously advocated. In 1819, though Mr. Tompkins, who had been very popular, left his position to become candidate for governor, Clinton was re-elected. In 1820 he contributed to a New York paper, under the signature of "Hibernicus," a series of sketches of travel along the proposed line of the Erie Canal. These were collected and published in 1822 under the title *Letters on the Natural History and Internal Resources of the State of New York*. During his second term as governor a State convention was called which made several amendments to the constitution, diminishing the powers of the executive and judiciary, and extending the right of suffrage. In consequence of these changes Clinton declined to be a candidate for governor, and in 1824 his political opponents even removed him from the post of canal commissioner, a position without salary. The people, indignant at this outrage, again set party machinery at naught and re-elected him governor; and in this term he had the proud satisfaction of seeing the completion of his great work, and being borne in triumph on a barge from the waters of Lake Erie down to the harbor of New York, Oct. 26, 1825. This work not only facilitated commerce, but largely increased the population of the State. Villages grew into towns and towns into cities; agriculture, manufactures, and commerce were quickened in their movements, and wealth flowed in from all sides. Clinton did not rest satisfied with the completion of this great work; by his advice branches were extended to the smaller lakes of the State, and numerous canals in other States were projected and constructed. While beholding the increasing prosperity of the Empire State, and still occupying the highest place in her gift, at the close of a day spent in public business he died suddenly at Albany, Feb. 11, 1828.

This outline of his busy and useful life sufficiently shows the character of the man. Physically and intellectually, he was well fitted to be a leader of the people, though not of a party. He was over six feet in height and well-proportioned, with intellectual features and dignified bearing. He was an impressive public speaker, a graceful writer, an enthusiastic natural philosopher, a patron of the arts and sciences. He was ambitious and fond of power, but only that he might use it for the public good. What Benjamin Franklin was to Philadelphia in the middle of the eighteenth century, De Witt Clinton was to New York in the beginning of the nineteenth. Besides the *Letters* already mentioned, he published a *Memoir on the Antiquities of Western New York* (1818), and many historical, literary, and political addresses. His life has been written by David Hosack (1829), James Renwick (1840), and W. W. Campbell (1849).

CLINTON, GEORGE (1739–1812), fourth Vice-President of the United States, youngest son of Col. Charles Clinton, was born in Ulster co., N. Y., July 26, 1739. He was trained by his father, and showed his enterprising character in early life by sailing in a privateer during the French war, as well as accompanying his father in the expedition to Fort Frontenac. At the age of twenty he was made clerk of the county court. He afterwards studied law, was admitted to the bar in 1764, and was appointed surrogate. In 1768 he was elected to the colonial assembly, and soon became prominent in his defence of the liberties of the people. In 1775 he was a delegate to the Continental Congress, where he voted for the Declaration of Independence, but before it was ready for his signature he was called to command a brigade of militia, and the next year he was appointed by Congress a brigadier-general. He was a deputy to the provincial congress of New York which framed the first State constitution in 1776, and at the first election held under it, April 20, 1777, was elected both governor and lieutenant-governor. He accepted the former office, and continued to hold it till 1795, being re-elected five times. He rendered distinguished service both in his civil and military capacity, and was known as the "champion of the Highlands." He exerted himself to save Fort Montgomery on the Hudson when attacked by Sir Henry Clinton, Oct. 6, 1777, for the purpose of opening communications with Gen. Burgoyne, and, though unsuccessful in defence of this post, prevented the co-operation aimed at by the movement. He was much harassed in his administration by the Tories. On Nov. 25, 1782, when the British army evacuated New York, Gov. Clinton and other civil officers marched in with Washington to take possession. In 1788 he presided in the State convention which adopted the Federal Constitution. To this instrument he was opposed, on the ground that it restricted too much the power of the separate States. But learning that nine States, the number necessary to put the constitution into force, had already given their assent, Clinton and his party withdrew their opposition, though they still demanded amendments. In 1789 he urged upon the State legislature to set apart lands in each new township for the support of common schools. In 1791 he advocated the improvement of internal communication by navigation companies, thus originating the movement which has given fame to his

ıew. De Witt Clinton. In 1792, when Washington
d President for a second term, Gov. Clinton,
ng the anti-Federalists, received 50 elect-
ıor Vice-President to 77 for John Adams.
e year John Jay, the Federal candidate for
New York, obtained a majority of the votes
but owing to some informality the votes of certain
were rejected and Clinton declared elected.
ose of this term he issued an address declin-
a further nomination, as he had now served the
ic in elective offices for thirty years. Yet in 1801
persuaded by Aaron Burr to become a candidate
anti-Federal or Republican party, and by the
wd management of that politician was elected
ernor of the State. This movement brought his
y into power not only in New York, but through-
the Union. and Burr was rewarded by being elected
e-Pr : yet his action at the very moment of
triumı isified Jefferson's dislike, and at the
t ıurr was a ruined politician, while Clin-
ır as Vice-President. In 1808,
ıe ıı ıo ı' Jefferson, Madison succeeded
o tue P y, while Clinton remained as Vice-
P ent. ıı ı811, while presiding in the Senate,
e the casting vote against the recharter of the
States Bank. He died at Washington, April
ıo12. He was frank and amiable in private life, as
was firm and dignified in public.

CLINTON, Sir Henry (1738–1795), an English
was born in 1738. His father, George Clinton,
admiral in the British navy and royal governor
ew York from 1743 to 1753, and his grandfather,
Fiennes Clinton, was the sixth earl of Lincoln.
ved a liberal education, was made a captain in
uards in 1758, and served on the Continent in the
en Years' War. In 1775 he was sent to America as
r-general, and arrived at Boston, May 25, in com-
with Gens. Howe and Burgoyne. At Bunker's Hill,
17, when Gen. Howe's troops found difficulty in
ing the American intrenchments, Clinton, without
ne for orders, brought up reinforcements, and other-
d himself in the battle. He was afterwards de-
ı, and went to Wilmington, N. C., where he await-
ıe arrival of Admiral Parker's fleet, and then took
part in the unsuccessful operations against Charleston,
S. C. Returning to the North, he was second in com-
in the movements that compelled the Americans
te New York in September. When Gen. Bur-
his expedition from Canada in 1777, Clinton
ove in vain to effect a junction with him, and for this
pose stormed Forts Clinton and Montgomery, Oct. 6.
ın Jan., 1778, he was appointed commander-in-chief of
the British land-forces in America in place of Gen. Howe.
In May he proceeded to Philadelphia, and a month
later, in obedience to orders from England, evacuated
that city. Gen. Washington started from his camp at
Valley Forge as soon as informed of Clinton's move-
ments, and overtook him at Monmouth Court-house,
where an indecisive battle was fought, June 28. The
British army continued its march without further mo-
lestation to New York. Though in command of nearly
30,000 men, Clinton did little more than watch the
movements of his cautious antagonist. In expedi-
tions in Connecticut and New Jersey his troops prac-
tised great cruelty, for which he is held responsible.
At last, when the British general Prevost had captured
Savannah, and successfully held it against the combined
forces of Gen. Lincoln and Count d'Estaing, Clinton,
believing that America could be as effectually conquered
from the South as from the North, sailed with part of
his troops to Charleston, S. C., and on May 12, 1780,
received the surrender of that city and of the entire
Southern army. He then issued a proclamation de-
nouncing all persons that remained neutral as enemies
and rebels, but the only effect of this was to strengthen
the opposition to the king's cause. Leaving Cornwallis
to finish the work of crushing the rebel spirit, Clinton
returned to New York, and endeavored, through Ben-
edict Arnold, with whom he had been in communication
for eighteen months, to secure possession of West Point,
which would have given him control of the Hudson and
effectually separated New England from the other col-
onies. Baffled in this, he remained inactive in New
York, nor could Cornwallis's urgent demands for help
rouse him until he found that Washington had depart-
ed for Virginia. Then, on Oct. 19, 1781, the very day
that Cornwallis surrendered at Yorktown, Sir Henry set
sail from New York, but on arriving at the entrance of
the Chesapeake, five days later, he learned the humil-
iating fact, and returned to New York. While he was
preparing to attack the French settlements in the West
Indies he was superseded by Sir Guy Carleton, and re-
turned to England in June, 1782. As Lord Cornwallis
had powerful friends, who threw the blame of his capit-
ulation on Clinton's tardiness, a violent controversy en-
sued. Clinton was elected to Parliament, and after-
wards made governor of Limerick. In 1793 he was
placed in command of Gibraltar, and died there, Dec.
23, 1795. He published *A Narrative of his Conduct in America*, 1783, a rejoinder to Lord Cornwallis's *Obser-
vations* on it, and *Observations on Stedman's History of the American War*, 1794.

CLINTON, the county-seat of De Witt co., Ill., is
on the Illinois Central Railroad, on the Gilman, Clinton,
and Springfield division of that road, and on the Wa-
bash Railroad, 43 miles N. E. of Springfield and 145
miles S. S. W. of Chicago. It has a court-house, two
banks, three hotels, three newspapers, six churches, a
music conservatory, a high school with fine building, a
public library; also a foundry, two flour-mills, two
grain-elevators, carriage-factory, tile-factory, hay-press,
and railroad machine-shops. Population, 2596.

CLINTON, the county-seat of Clinton co., Iowa, is
on the Mississippi River, the Chicago and North-
western Railroad, the Chicago, Milwaukee, and St.
Paul Railroad, the Chicago, Burlington, and Quincy
Railroad, and the Burlington, Cedar Rapids, and
Northern Railroad, 138 miles W. of Chicago. It has
a splendid iron bridge, 4000 feet long, connecting this
city with Fulton, Ill. It has three banks (one national).
one daily and three weekly newspapers (one German),
twelve churches, a high school and other public schools,
a public library, large water-works, gas-works, and an
excellent sewerage system It is largely engaged in the
manufacture of lumber, and has several saw-mills, two
sash-and-door factories, two paper-mills, railroad ma-
chine-shops, two foundries, asphaltum-works, canning-
works, and flour-mills. Population, 13,628.

CLINTON, James (1736–1812), a brigadier-general
in the Revolutionary army, was the fourth son of Col.
Charles Clinton, and was born in Ulster co., N. Y., Aug.
9, 1736. He was carefully taught, and served as cap-
tain in Bradstreet's expedition in 1756, distinguishing
himself at the capture of Fort Frontenac. In 1763 he
commanded a large body of troops defending the settle-
ments in Ulster county against the Indians. When the
Revolutionary war broke out he was made colonel, and
served in Gen. Montgomery's expedition to Canada.

He was made brigadier-general Aug. 9, 1776, and was chiefly employed under Gen. Putnam in preventing the British from ascending the Hudson. He was in command at Fort Clinton on the Hudson when that fort was attacked, Oct. 6, 1777, by a large British force under Sir Henry Clinton, who had succeeded in deceiving Gen. Putnam as to the object of his expedition. After a gallant defence the fort was taken by storm, Gen. Clinton being the last man to leave the works. He had received a severe bayonet-wound, but, sliding down the rocky precipice, he escaped to his home, sixteen miles off. In 1779 he took part in Gen. Sullivan's campaign against the Iroquois of Western New York, and afterwards was in command of the northern department at Albany. He was present at the final operations of the war at Yorktown, and at the evacuation of New York by the British. He was afterwards one of the commissioners to settle the boundary-line between New York and Pennsylvania. He was a member of the State convention which adopted the Federal Constitution in 1788. He was also elected to the assembly and to the senate of New York. He died at Little Britain, N. Y., Dec. 22, 1812.

CLINTON, a town of Massachusetts, on Nashua River, at the crossing of the Worcester and Nashua and the Boston, Clinton, and Fitchburg Railroads, 45 miles by rail W. by N. of Boston. At South Clinton, near the village, is a station of the Massachusetts Central Railroad. The river affords extensive water-power, utilized in large factories, which turn out cotton goods, carpets, ginghams, plaids, machinery, wire goods, counterpanes, castings, etc. The town has a high school, a national bank, a savings-bank, a town-hall, churches of the leading denominations, and a newspaper, and is one of the most thriving places in New England. Population of township in 1880, 8029; in 1890, 10,379.

CLIPPER SHIPS. A clipper is a sailing vessel of peculiar construction, designed for great speed rather than for capacity. It has a long sharp bow, flaring outward as it rises above the water, a long clean run aft, hollow water-lines, a rising floor, raking masts, and a great deal of sheer. The period of American maritime ascendency was identical with that of the clipper ship.

The freighting- and war-vessels in vogue when America was settled were of a short, bluff type. They had full round bows, floors extremely full and flat, and swelling sides, the broadest part of the ship being about two-fifths of the length aft of the bow. Some of them were very straight and level on deck from end to end, having little sheer. The old bluff form came down to later times in the line-of-battle ships of the Revolutionary period, and in the sugar and cotton vessels and East Indiamen which were produced by American yards in great numbers after the peace of 1814. Circumstances gradually led to changes with a view to increasing the speed of vessels. For a long period both before and after the Revolutionary War American vessels were very much molested at sea. British and Spanish law, and at times French law, forbade American ships to trade to and from certain colonial ports which were excellent markets for our fish and agricultural products. Rather than give up their trade, American owners chose to run the risk of loss of their ships. Good sailing qualities then became of the first importance, and a great deal of attention was paid to the study of the shapes of such vessels as had developed great speed. In 1778 the alliance with France brought a number of French war-vessels to our shores. Some of these vessels were hauled out of water on the marine railway at Salem, Mass., for repairs. Their models were the finest in the world, and they were immediately copied and improved upon with advantage. Congress having ordered the construction of four frigates and three sloops-of-war, the very best talent in the country was employed upon them, and French ships were taken as the pattern. The building of the Alliance, one of the new frigates, was perhaps the first step in the evolution of the clipper ship. The Alliance was the pride and favorite of the whole navy. She was 135 feet long on the keel, 151 feet 7 inches on the gun-deck, 36 feet broad, and 16½ feet deep under the spar-deck, being about the size of a three-masted coasting-schooner of the present day. In 1782, while chased by an English ship too big to fight, she ran fifteen knots an hour with the wind abeam. The Alliance drew 14½ feet of water aft and 9 feet forward, and was sharp on the floor. Speaking of the American navy in the Revolution, Fincham says: "But the American frigates were excellent vessels in point of sailing, and so peculiarly adapted to the existing circumstances of the country at that time." The Alliance and her sister-ships had a great influence on the forms of vessels after the Revolution, but models remained short and deep, a good entrance forward being secured by a lighter draft there.

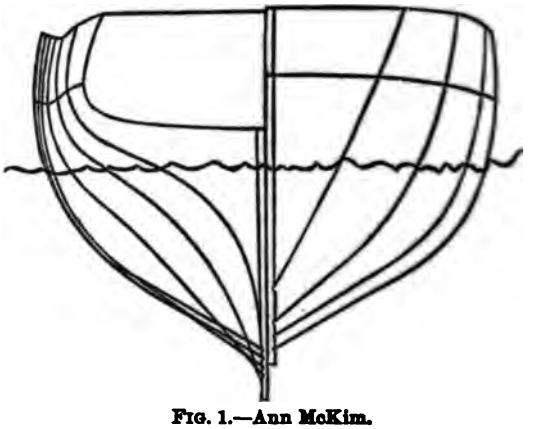

FIG. 1.—Ann McKim.

In the War of 1812, America became famous for fast ships. Some of the best were built at Baltimore, a city whose builders had been for years producing a species of fast vessel intended originally for the African slave-trade. These vessels were long, low schooners, with flaring bows, raking masts, a great spread of canvas, and a deep draft aft. Some of these slavers drew 16 feet aft and 8 feet forward. They were of small carrying capacity, but in the War of 1812 they did good service as privateers. In that war Baltimore sent out 58 privateers, New York 55, Salem 40, Boston 31, Philadelphia 14, Portsmouth 11, and Charleston 10. It is said that not one of the new vessels was captured. Sharp floors, greater length, clean runs, a usually lighter draft forward, and a towering cloud of canvas secured the result. The sailing qualities and large size of American frigates in that war were so marked as to compel England to order the building of large vessels for her navy.

The privateers of 1812
can vessels permanently.
one of them fit to go
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provided only with a few erroneous maps and charts, a sextant, and a "Guthrie's Grammar," their masters set sail for regions they knew nothing about, relying only on their smart vessels and Yankee pluck for a prosperous voyage out and a safe return. The speed of these vessels was of great advantage in trade; and while full ships continued to be built for carrying cotton, sugar, salt, and other bulky commodities, for all first-class service a better type of vessel was employed.

The new type reached its perfection in the packet-ships, which were soon sailing in regular lines to European ports. Passenger-, express-, and mail-traffic

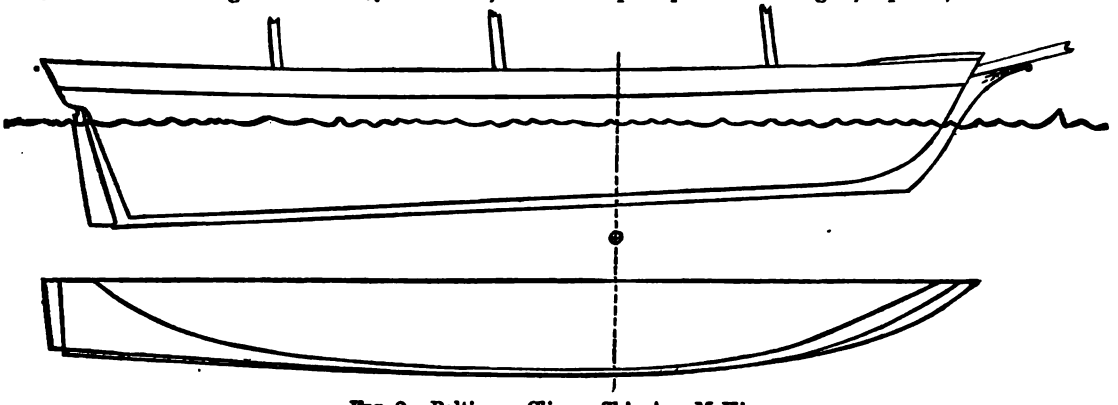


FIG. 2.—Baltimore Clipper Ship Ann McKim.

was all transacted by the packet-ships in that age, and American builders managed to make these vessels so smart that they generally ran to Europe in nineteen days, or an average of two or three days' shorter time than their European competitors. From 1850 to 1860 the packets plying to Liverpool reached the size of 1400 and 1600 tons, and were generally built with three decks. It was only one step from the packet to the clipper ship.

The Ann McKim, a clipper built at Baltimore in 1832 (length on water-line, 143 feet; beam, 32 feet; depth of hold amidships, 14 feet), was of an extreme type of sharpness. In fact she was too sharp for a cargo-ship; but a schooner built of the same model was a capital vessel, and proved a remarkably swift sailer. (See figs. 1, 2.)

The first of the famous American clippers were built at New York. The pioneers were the Helena, 650 tons, built in 1841 by Wm. H. Webb, and the Rainbow, 750 tons, built in 1843 by Smith & Dimon. In 1844 the Howqua and Montauk were built for the tea-trade. Soon afterward John W. Griffiths of New York designed the fast ship Sea-Witch, and the vessel was built by Smith & Dimon. These were the first of the clipper ships. The Sea-Witch soon became famous, and though repeatedly beaten afterwards by the larger ships which succeeded her, she is believed to have had more influence on the form of deep-sea vessels than any other merchant ship ever built in the United States. With her the full bow and long, sharp run went out of fashion, and the long, sharp bow, with a fuller after end, came into permanent use the world over for fast ships of the merchant marine. The Sea-Witch was 170 feet 3 inches in length, 33 feet 11 inches in breadth, and 19 feet in depth. The proportion of width to length was as 1 to 5, whereas the old rule was

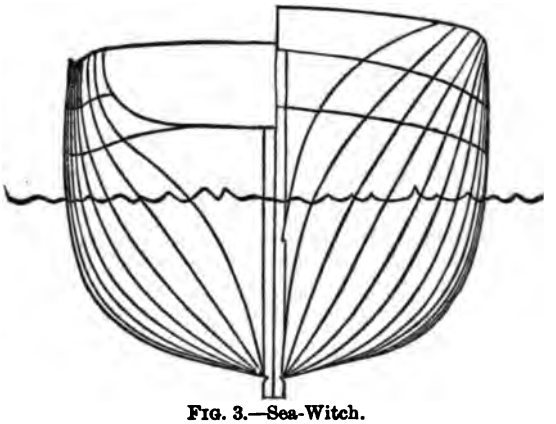


FIG. 3.—Sea-Witch.

as 1 to 4. The new clipper registered 907 tons, and would carry 1100 gross tons of cargo. Owing to the

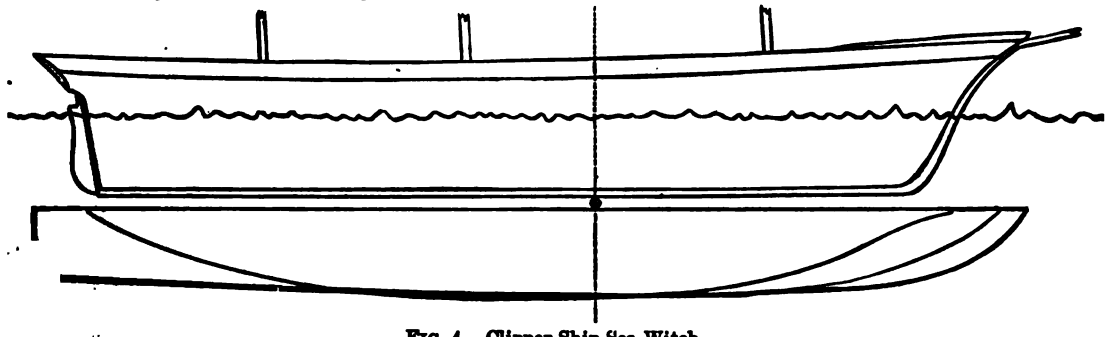


FIG. 4.—Clipper Ship Sea-Witch.

sharp rise of her floor (16°) she was unstable without ballast and rolled considerably in a sea-way. But her speed was surprising and her general performance satisfactory. The naval architects of two continents made her a subject of study. (See figs. 3, 4.)

The long bow of the clipper ship was soon seen to possess an advantage in lessening the resistance of the water to the progress of the vessel, and in gaining this much-desired object while permitting the vessel to sail on an even keel. The swell raised by the bow was brought farther aft than in the case of the full ships, thus giving a better support to that part of the vessel which required support the most. The crankiness of the ship due to the sharpness of the floor was overcome, as far as could be, by carrying the sides up straighter from the water-line, diminishing the "tumble home," and giving them only the faint curve inward required by beauty of outline. Round and elliptical sterns began to be built in place of the old square sterns.

For the first few years clippers were employed chiefly in the tea-trade from China to England and America. That trade began for American vessels in 1784, and Salem soon sent out a large number of ships to China; other ports followed, and for a long period of time the duty on tea was the principal source of the revenue of the U. S. Government. Tea loses its quality during a long ocean-voyage, and the fleetest ships were thus always in demand for the China trade. It was a source of profit also to reach the home market first with the first of the new crop of tea, and in time the habit grew up of racing to England and America annually with the first cargoes of that precious article—another circumstance which led to the construction of fast vessels for the trade. In 1852 the races between the tea-ships were attracting so much attention that the American Navigation Club of Boston offered £10,000 to the vessel which should win the next race, an American clipper against a British one of 1200 tons register, the ships to run from London to China and back under certain regulations. After the offer had been published for thirty days in England it was raised to £20,000, and the British ship was promised fourteen days the start. The challenge was never accepted. While the subject was under discussion a race took place from Canton to Liverpool and Deal which resulted in favor of the American clipper, as follows:

Aberdeen-built clipper Chrysolite, Canton to Liverpool, 106 days.
Aberdeen-built clipper Stornaway, Canton to Deal, 109 days.
American clipper Challenge, Canton to Deal, 105 days.
American clipper Surprise, Canton to Deal, 106 days.
British ship Challenge, Shanghai to Deal, 113 days.
American ship Nightingale, Shanghai to Deal, 110 days.

In the latter part of 1848 occurred the discovery of gold in California, which stimulated the building of clipper ships in an extraordinary manner. From nearly every Eastern port loaded vessels were at once despatched to California. They were mostly brigantines and barks of small size, which consumed from 150 to 160 days in making the voyage. The profit on this early trade with the Pacific coast was immense. Fast vessels came into immediate demand, a good ship being able to exact a double freight on all the goods she carried. A great many Baltimore-built vessels were bought to go into this business. In 1850 two small tea-ships arrived from New York at the Golden Gate with cargoes of goods, having made the run in 100 days. The quick trip created great excitement. The John Bertram, an extreme clipper of 1100 tons register, the pioneer ship of the old Glidden & Williams line, built in East Boston in 1850, was launched in sixty days from the laying of the keel, and in thirty days thereafter was on her way from Boston with a full cargo of goods for the Pacific, at $40 per ton freight. Twenty-nine years afterward the John Bertram was still a good ship. The Witch of the Wave, 1500 tons, followed the first vessel, and four others from the same model came soon afterward. All the leading builders of the United States devoted themselves to the construction of clipper ships, and New York, Boston, and Baltimore vied with each other in the business. In less than a year's time clippers of 2000 and 2500 tons were being built and set afloat, and the increase in size did not stop until one of 4000 tons was launched at East Boston, the largest and finest sailing ship ever built. The year 1853 is noted for the number, beauty, and fleetness of its vessels. The packets improved in shape while the clippers were being developed, and by 1855 the American packets, the Californian, and the East Indiamen were the noblest, fastest, and largest types of merchant-vessels sailing on any sea in any part of the world.

Extreme clippers remained in vogue only a few years. Owing to the depth and sharpness of their floors they lacked stability, and in consequence of the sharpness of the ends those parts did not have buoyancy enough to sustain their own weight—a fact which led to the straining and weakening of the vessel. A change was made in 1855 by joining to the clipper top, bow, and stern the fuller bottom of the old-fashioned freighting ship. The midship section, or widest part of the ship, was also moved farther aft, so as to be only a trifle forward of the middle of the ship's length, and the vessel was made to float substantially on an even keel. That style of vessel remains in use to the present day, although capacity is now the chief aim in American sailing ships rather than speed.

The performances of some of the clippers were remarkable. America led the world in maritime achievements. In 1851 the clipper Nightingale was built at Portsmouth, N. H., by Samuel Hanscom for exhibition at the World's Fair in London. When she entered Boston harbor her beauty and power led to her immediate purchase by Sampson & Tappan for the foreign trade. The Nightingale was 178 feet long, 36 broad, and 20 deep. She registered 1066 tons, and was an extremely sharp ship. In 1852, on her way from Shanghai to London, she ran 336 nautical miles in twenty-four hours, making the distance from Batavia Roads to London in 70 days, and the whole distance in 110. From New York she ran to Melbourne in 1854 in 76 days 16 hours. In 1851, Donald McKay, of East Boston, built the Flying Cloud, a clipper measuring 208 feet on the keel, 41 feet in breadth, and 21½ in depth of hold—1782 tons register. She made her first voyage to California in 89 days 18 hours. On one day she ran 427½ miles, then the fastest time on record. Mr. McKay in 1852 built the clipper Sovereign of the Seas, 2421 tons, 245 feet long on the keel, 44½ feet broad, and 25½ feet deep in the hold. She was the largest, sharpest, and longest vessel in the world at the time of her construction. In four days she ran 1367 miles, an average of 341¾ miles a day. Once she made 436 miles in twenty-four hours. This ship earned $200,000 gross during the first eleven months of her existence. The Comet, built by William H. Webb at New York, ran from San Francisco to the home port in 76 days. This

been beaten except by the Trade Wind, ... in 75 days. The Comet sailed from

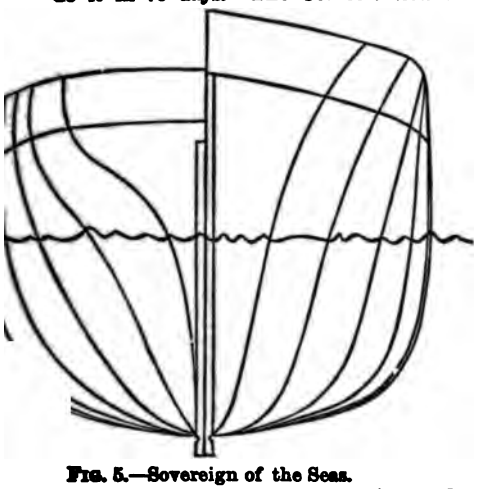


Fig. 5.—Sovereign of the Seas.

...ool to Hong-Kong, 13,040 miles, in 84 days. ...Young America, built by Webb, ran from San Francisco to New York in 83 days, and sailed 365 knots in twenty-four hours. The famous clipper Red Jacket, designed by Samuel M. Pook, has run from New York to Liverpool in 13 days 11 hours. That achievement stands to the credit of many other American vessels, however. The Dreadnaught beat that time by 3 hours. She was 200 feet on deck, 40 feet wide, and 26 deep—1413 tons. The Red Jacket has made the run from New York to Melbourne in 69 days 11 hours. The clipper Northern Light ran from San Francisco to Boston in 76 days 8 hours. The Euterpe, of Rockland, Maine, sailed from New York to Calcutta, 12,500 miles, in 78 days.

The largest clipper ever built was the Great Republic, 4000 tons, launched in 1853 at the yard of Donald McKay in East Boston. This ship was 325 feet long, 53 broad, and 39 deep. Aft she drew 28 feet of water. For 60 feet from the bow the keel gradually rose as it went forward, until at the gripe-piece it described the complete arc of a circle. The bow was sharp, but the rising keel was introduced to make the entrance cleaner and lessen the resistance still more, while at the same time giving additional strength to the bow. The ship had a long, clean run, hollow water-lines, and sides which swelled four feet, like an ancient man-of-war. The bottom was full and flat, the dead rise being 20

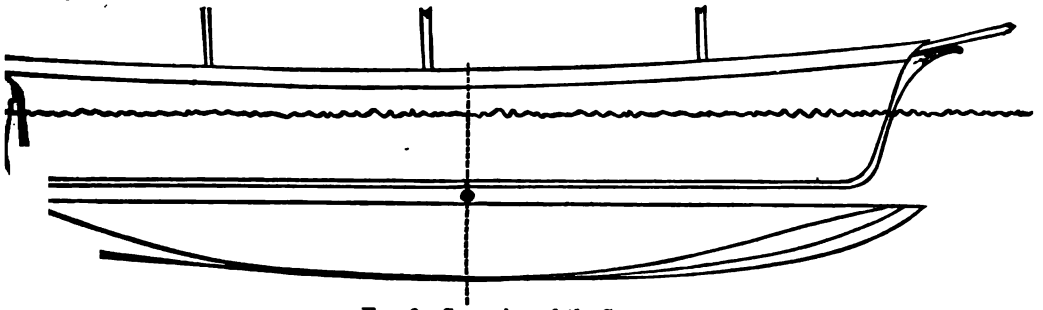


Fig. 6.—Sovereign of the Seas.

. There were four decks and four masts, ...f the latter being very great. From keel

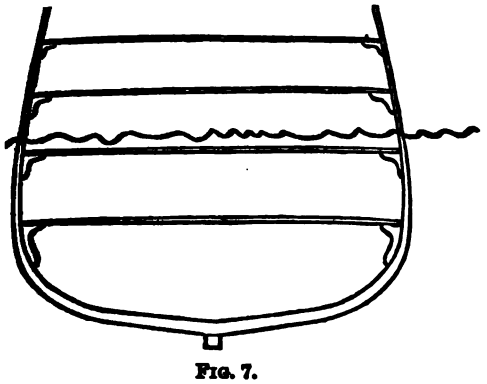


Fig. 7.

...tion of the Great Republic.

... distance was—foremast, ... feet; mizzenmast, 204. The ... There were 15,653 yards of ... main yard being 120 feet long. ... Great Republic never had a chance ... While loading at New York for caught fire, and the topsides were burned off. She was cut down to a three-decker then, and supplied with three masts only. In that form her performance was never regarded as specially remarkable. (See fig. 7.)

The Lightning, built by Donald McKay in 1854, was one of his smartest clippers. She ran from Boston to Liverpool in 13 days 20 hours; Liverpool to Melbourne in 77, 65, and even in 63 days, and the return voyage in 64 days. She was 227½ feet on the load-line and 44½ feet broad, and drew 17 feet of water.

The disappearance of the packet and clipper ships was due to the establishment of well-managed steam lines on all the principal routes of ocean trade and travel. (H. H.)

CLOCKS. The conditions under which clocks are manufactured in the United States are so different from those which obtain in Europe as to require an entire change in the system of manufacture. While in Europe very few, if any, factories turn out over 10,000 per annum, in this country more than that number are frequently furnished and shipped from a single factory per week. American manufacturers rely on labor-saving machinery to produce their goods with rapidity and at a price that shall command a sale even in the most distant parts of the world.

See Vol. VI. p. 18 Am. ed. (p. 18 Edin. ed.).

The enormous plant required to produce goods cheaply necessitates a great outlay of capital. Between the

years 1852 and 1857 two-thirds of the clock-manufacturing companies in the United States either failed or were compelled to withdraw from the business on account of the great competition in prices; and at the present time the entire industry is in the hands of some six or eight firms, of which number three produce about two-thirds of the whole amount manufactured. The most prominent firms are the Ansonia Clock Co., Brooklyn, N. Y.; Seth Thomas Clock Co., Thomaston, Conn.; New Haven Clock Co. of New Haven; E. N. Welch Manufacturing Co., Forestville, Conn.; Waterbury Clock Co., Waterbury, Conn.; and, for a higher class of clocks, the Howard Clock Co. of Boston, which devotes itself to regulators, bank, office, and turret clocks.

A description of the new factory of the Ansonia Clock Co. of Brooklyn, N. Y., will give an idea of the system which is adopted at all the factories in the United States. The floor-space occupied amounts to 142,000 square feet, and is divided between the main factory, foundry, wood-shops, varnish-rooms, dry-kilns, and engine-house. The power is furnished by two 250-horse-power engines, and all the buildings are lighted with gas made on the grounds. Throughout the entire works at every fifteen feet there is an automatic fire-extinguisher, so arranged that when the temperature reaches a given point water will be thrown entirely across the room. More than forty miles of pipe are required to distribute steam, gas, and water throughout the works.

The number of hands employed in May, 1881, was 1075, a considerable proportion being boys and girls, as the machinery is to a great degree automatic. The brass for the plates, wheels, etc., is rolled in a separate factory, owned by the same company, at Ansonia, Conn., and is prepared to a standard gauge for each required part.

The plates are first cut to size, and all the brass not required for the support of the train is removed by a single blow of a punching-machine, the plumper of which has the shape of the parts to be removed. The plate is then passed to another machine, which punches all the holes for the posts and pivots except where the holes are of less diameter than the thickness of the plate; the position of these holes is marked by this machine, and they are drilled at a separate operation. After the plates are cleaned by being placed with sawdust in large iron holders which revolve at an angle, thus causing the pieces to rub one against another, they are taken to the finishing-room, dipped for a moment in boiling acid, thoroughly washed, dried in sawdust, and treated with a very thin coat of lacquer; after which they are spread to dry on large metal tables heated by steam. The plate is then ready to receive the posts or pillars: these are made of heavy wire, which is fed through a straightening machine to an automatic cutter, which cuts them exactly to the required length; then they are fed to a machine for cutting the shoulders, both of which are cut at the same moment. The wire is grasped in the centre and held horizontally while two revolving cutters advance, one to each end, and, having been cut to the required depth, which is regulated by a gauge, the wire falls into a receptacle provided, and the operation is repeated. The same method is substantially used in all cases where wire is required for the pivots or posts in any part of the clock. The blanks for the wheels are punched and gutted in the same manner as the plates. A workman takes from 60 to 80 of these blanks and passes a spindle through the centres, care being taken that the blanks are firmly fastened, so that they may not move while being cut. The spindle, with its charge of blanks, is placed in the cutting-machine in a horizontal position. The cutters revolve vertically at a right angle to the plane of the intended wheel. Each tooth requires three cuts to complete it—the first a saw cut, next the rounding up, and thirdly the finishing cut. The three cutters are upon separate arbors, being placed in exactly the same line, and as the workman with one motion passes the charge of blanks under each cutter in the proper order, the entire tooth is practically cut at the same time. The time required to cut one charge of from 60 to 80 wheels averages about three minutes. The pinion most used in the American clocks is that which is known as the lantern. The wires for the arbors, cut to the required length, are placed upon an inclined plane, down which they pass in regular order, while the planchets for the top and bottom of the pinion (being first punched a little larger than required when finished, and also drilled in the centre to receive the arbor) are placed in a hopper.

The machine being started, one wire falls from the plane and is brought opposite the hole in the planchet; at the same moment a plunger, working horizontally, strikes the wire and drives it the required distance to place the pinion in the proper position on the arbor. The top and bottom of the pinion being thus placed, it is next passed to a workman who turns off any surplus metal, and if a shoulder is required anywhere on the arbor, it is turned at the same time. To accomplish this, two cutters are placed in a holder which works in a guide, but is directed by the hands of the workman; this holder is squared in the centre and rounded where the workman grasps it at either end. The cutters, being set at the proper distance, of course make two cuts, either in a plane parallel with the axis of rotation or at right angles to it, as may be desired. Two other cutters are placed in the same holder at 90° from the first, so that four cuts may be made by revolving the holder one-quarter of a revolution. The heads, now being finished, are drilled to receive the wires which constitute the leaves. This operation is mostly performed by girls. An arbor bearing the top and bottom of the pinion is grasped horizontally in a clutch which is connected with a plate having as many holes as leaves are required in the pinion; this part is then advanced against a drill also working horizontally and revolving at a speed of about 18,000 revolutions per minute; the hole is drilled through the head of the pinion and partly through the bottom, accuracy in depth being secured by a stop. The sliding holder is withdrawn and turned to the next hole in the plate, when the operation is repeated until the proper number of holes is drilled.

The blanks are then ready to receive the leaves: these are of steel wire, which is polished and cut to the required length, a trifle less than the depth of the holes already drilled. Girls then drop these small wires with astonishing rapidity into the holes; they are passed directly to another series of hands, who by a few light blows of a riveting hammer worked by the foot close the holes over the ends of the leaves, and the pinion is finished.

The main springs (weights being very little used at present except where great accuracy of time is desired) are coiled and tempered as any other spring would be, and each spring is then separately tested for strength in the following manner: One end of the spring is fastened firmly to a holder, and the other is connected to an arbor which is allowed to revolve; suspended from this arbor is a weight which the spring in uncoiling is required to raise to a given height. Failing to do this, it is rejected. All the smaller parts of the clock, such as the clicks, lever, etc., are made by automatic machinery. A considerable proportion of the clocks at present made are of the small lever style, going in any position. The manner of making the balance-wheel is interesting. A brass tube slightly larger than the required diameter of the wheel is placed in a lathe, and the workman turns out the inside to a gauge, and afterwards, with another cutter on the same lathe, the outside circumference of the wheel. A cutter working vertically then cuts the circle from the tube, the cutter being so shaped as to finish the inside surface at the same time. One man will turn 3000 balances per day. The next process is to drill the holes for the arms. The rings of metal are placed singly upon a vertical hub made so as to revolve one-third of a revolution at each movement; this hub moves upon a horizonal plane and brings the part to be drilled against a fast-revolving drill. One hole being drilled, the hub is drawn back, turned 120°, and the operation repeated; the small steel wires are then inserted to con-

sect the periphery with the collet which fits the balance-arbor.

The making of the hair-springs requires more skill on part of the workman than almost any other portion of clock. The steel is rolled to the proper thickness and the desired width. The operative then takes four of se strips and places one on top of the other, being care- that the ends are exactly even. He then puts one end in an arbor similar to those used by watchmakers main springs. This arbor is then slowly and care- revolved until the strips are almost wound inside of all box like a shallow main-spring barrel of a watch: just before the winding is completed another strip of steel inserted of sufficient length to exactly fill the box, thus venting the coils from expanding. A small metal table ted by a gas-flame is placed on the workbench immedi- ely before the workman, who, as soon as the spring is nd, removes it, still in the box, and places it upon this l table to temper, watching the process carefully and ng by the color when the springs should be removed. completed hair-spring is then fastened to the collet by rting the end of the interior coil in a diagonal cut in the let, which cut is closed by a light blow with a hammer.

As the various parts are finished they are taken to the e-room and placed in separate bins until wanted. The k of putting the clock together is done by girls. The er plate having been placed in a clutch on the work- e, the various parts are taken from the different boxes, into their proper position, and the upper plate put on fastened either by screws in the posts or by pins. The ldity with which this operation is performed is wonder- : each girl is expected to put about 400 clocks together a working day.

From the setter-up the movement now passes to the ad- r, who inserts the balance-wheel and approximately ates it. The men to whom is entrusted this operation placed by twos in separate rooms. A clock with the e calculations as those to be regulated is placed in a ition where the vibrations can be distinctly heard. Af- ter putting in the balance-wheel the workmen compare the vibrations for a few seconds, and either shorten or lengthen the hair-spring as the case may require until the clock un- der regulation makes forty synchronous vibrations with the standard, when it is considered regulated; and so ex- pert do these adjusters become in detecting a difference in vibrations that a movement seldom varies three minutes in twenty-four hours. If the variation reaches this amount a returned to the person who adjusted it and is charged his work.

striking part of an American clock is totally differ- ent from that of a French or English clock, both the lock- ing and striking part being between the plates instead of under the dial; the rack and snail are entirely discarded, and in place a wheel is substituted having twelve deep cuts, into one of which a wire arm falls after the striking of each hour. Between these deep cuts ratchet-shaped teeth are cut on the periphery of the wheel, in number in accord- ance with the strokes required for the several hours. This wheel is placed on the same arbor with the wheel bearing the lifting-pins for raising the hammer, but is held in its place by a spring allowing a free motion separate from the wheel with which it is placed. Projecting from the pinion which meshes into the wheel bearing the lifting-pins is a pin which upon each revolution of the pinion catches one of the ratchet-shaped teeth before described and moves it ward. As the number of leaves in this pinion is the e as the number of teeth between the lifting-pins, it follows that at each strike of the hammer the count-wheel is advanced one tooth, and when one of the deep cuts is reached the arm falls and completes the locking. To effect the warning and locking an ingenious system of light wire rods bent in dies to the proper shape renders the parts very inexpensive to construct.

The manufacture of the cases is a very important ra t of a clock-factory. For many years the only o of known were the large square and the in Gothic, but as the popular taste improved . and the success of a manufacturer h to the style of his cases as the quality of the movements. For the wooden cases the wood is first dried in large kilns, being so stacked that the heated air will pass over and under each piece; as the air becomes filled with the moisture from the wood, it is drawn off in such a way that a constant circulation is maintained.

The smoothing of the wood is very expeditiously and and effectively done. Instead of the ordinary method of sand-papering by hand, drums 5 feet in diameter, driven by steam, are covered with a coating of sand, and the part to be smoothed is held for a moment against the face of the drum, and all inequalities are thus removed. When it is required to sand-paper a moulding the reverse of the moulding is cut upon the drum, covered with sand, and when the moulding is brought in contact with this surface the polishing is done very thoroughly.

Within the last few years iron cases in imitation of the French marble clocks have been in great demand; these are so cast as to secure as good a surface as possible. They then receive three coats of lacquer, and after the application of each coat except the last they are baked in large ovens for four hours. When the finishing-coat is applied they are left in the ovens for twelve hours. After the movements are put in the cases they are again run for twenty-four hours, and then packed for shipment.

The amount of capital invested in this industry is, as closely as can be ascertained, nearly $4,000,000; annual production in value, $6,000,000; number of clocks produced annually, 2,500,000. In all there are 15 firms engaged in clock making, 11 of which are in Connecticut. About one-third of the entire production is exported to foreign parts. (G. W. R.)

CLOGHER (Gaelic, *cloch*, stone) is the name of three parishes in Ireland: one in Tipperary, with an area of 8119 acres and a population of 1600; one in Louth, 7 miles N. E. of Drogheda, with an area of 1809 acres and a population of 1300, mostly engaged in fishing; the third Clogher is a town as well as a parish in county Tyrone, about 7 miles W. of Aughnacloy. It is built on a hill where, as the name implies, building-materials abound, and the houses are more substantial than in many Irish villages. Being the residence of a bishop, it has a cathedral and palace, which, with the churchyard wall, form one side of the only street. It was erected into a borough in the reign of Charles I., and returned two members to Parliament, but at the time of the legislative union with England it was disfranchised. The area of the diocese is 49,761 acres, and the population 14,000. (J. M.)

CLONTARF is a village about 3 miles N. E. of Dublin, Ireland, and gives the name to one of the suburban parishes, embracing 1190 acres. The name, in the original Gaelic, is *Cluan Tarrbh*, or the "Bull's Meadow." Out a little from the north shore of Dublin Bay there is a bank against which the waves strike with a noise resembling the roaring of a bull; so the bank came to be called "the Bull," and the beautiful meads inland became the "Bull's Meadow," in accordance with the fine fancy which so often regulated the formation of Celtic names. The village, which stretches in a rather disconnected way along the roadside, consists of the greatest variety of dwellings, from the humblest cabins to the fine seaside residences of the prosperous Dublin merchants. Inland from the road are substantial mansions surrounded by beautifully laid-out grounds, and forming perhaps the most salubrious of the numerous immediate outlets of the Irish cap-

ital; and both villas and village are largely resorted to for bathing purposes. The population of the parish is 4209, and is increasing. Clontarf occupies a prominent place in Irish history, being the scene of one of the most signal victories ever won by the Irish for themselves. The battle was fought on Sunday, 18th of April, 1014, under Brian Boroimhe, king of Munster, on the native side, and Maelmordha on the side of the Danes, who were defeated and their dominion in Ireland brought to an end. Clontarf was to have been the scene of one of O'Connell's "monster meetings" in 1844, but the Government having interdicted the meeting, it was countermanded by O'Connell. (J. M.)

CLOUDS. There are several natural phenomena which, though not apparently so, are identical in origin and general character. Of these we may name the "sweating" of the outside of a pitcher of cold water; the hoar-frost which forms on the inside of a window in cold nights; the deposition of dew; the formation of fogs or mists; and the production of clouds in the upper atmosphere. The cause to which these several effects are due is a double one. Primarily, it is the absorption of water-vapor by the air, which takes place at all points of the ocean-surface and over all inland waters, the saturated air being conveyed to the higher regions of the atmosphere by its tendency to rise when warmed, and distributed over all parts of the land-surface by the agency of the winds. If this were all, the atmosphere would soon everywhere become fully saturated, and no further evaporation and absorption of water could take place. But, secondarily, the saturation-point of the atmosphere changes with every change of temperature. When chilled, it is unable to hold as much vapor as when warmed; and the excess vapor is condensed into water, which is suspended as fog or cloud, or falls as rain. The exact effect of chilling is the following. It is known that air doubles its capacity for water-vapor with every 27° increase of temperature, this capacity at 32° F. being $\frac{1}{160}$ its weight of transparent vapor. In consequence, a cubic foot of fully-saturated air at 80° will hold 10.81 grains of water; at 60° it will hold but 5.87 grains. If chilled to this extent, nearly 5 grains of water must fall as rain from every cubic foot of air. Such a variation of temperature is incessantly taking place in the air, which constantly loses its contained vapor in consequence. This loss is replaced by new evaporation, and thus a steady circulation goes on, the ocean feeding the rivers through the medium of the atmosphere.

Warm air is chilled by contact with cold surfaces, by expansion, and by contact or mixture with colder air. In the examples mentioned, of the pitcher and the window, it is the contact of warm moist air with a cold surface, which forces it to deposit some of its vapor as water. In like manner, the rapid radiation from the earth's surface, of a clear night, chills the surface and the air in contact with it. The air thus loses to some extent its capacity for vapor and deposits part of it as dew, or as frost if the temperature be sufficiently reduced. Fogs and mists arise from the same general cause. The atmosphere is chilled to some distance above the cold surface and its vapor is condensed into water, which remains suspended in the atmosphere instead of falling. Clouds differ in no respect from fogs, beyond that of their greater height. They also arise from the chilling of warm, moist currents of air, and the consequent reduction of their saturation-capacity. These may be uprising currents, which are chilled by expansion or by mingling with colder layers in the upper air, or they may be horizontal currents or winds, which blow into colder regions. In the action of mountains on moving air all these influences are combined. The horizontal winds are forced upward by the mountain, and chilled both by expansion and by mingling with the colder air of the higher atmosphere, and also by contact with the cold surface of the mountain. It is for this reason that rains are particularly abundant in mountain-regions, and that high peaks are apt to be encircled with a cap of clouds. This, indeed, frequently takes the form of a long cloud-streamer, reaching far out from the mountain. Though seemingly the same cloud, such a streamer is, in fact, continually reproduced. It indicates that a current of warm air is blowing over the mountain, its moisture being constantly condensed at the summit and constantly revaporized at the extremity of the streamer. In addition to the above, the daily heating and nightly cooling of the surface of earth and water produce diurnal effects upon cloud-formation, frequently yielding mists or fogs.

In regard to the cause of the suspension of clouds, which is remarkable when we consider the immense weight of water which they represent, there have been various theories. One view holds that the cloud-particles are minute vesicles, or bubbles, of infinitesimal weight. But the prevalent view at present is that they are really solid, but excessively minute. Measurements made by Kaemtz give .00087 of an inch for their average diameter in mists; thus they approximate to the floating motes of the air in weight. They are also undoubtedly sustained, to a considerable extent, by the uprising currents of warm air to which many clouds are due. Yet a cloud is by no means the impassive mass it often appears. Telescopic observation proves that incessant motion and change occur in seemingly unvarying clouds. In many cases it is probable that the cloud-particles constantly descend as rain even when no rain reaches the earth. The gathering drops fall into a region of warmer, unsaturated air below, by which they are revaporized, and thus vanish. In such a condition the cloud is analogous to the mountain-streamer above described. It is constantly moving downward, and is constantly dissipated below and renewed above, its vertical transformation thus resembling the horizontal one of the cloud-streamer. It is only when the falling drops reach the earth that we have the phenomenon of rain. If they become frozen during the condensation of vapor into cloud, snow results. The conditions of congelation which produce hail are not well known.

Fog is the form of cloud whose immediate origin can best be observed. It is found to be always due to the one influence, the chilling of saturated air. But the action of this cause varies. In the one case it is the contact of warm air with a cold surface; in another it is the rising of moist air from a warm surface into colder atmospheric layers. The latter takes place over the warm surface of rivers, whose emitted vapors are carried by warm air into the chilled layers of the night-air above. On the contrary, the nocturnal coldness of the ground in autumn and winter is apt to chill the air for a considerable distance upward and produce those low fogs which quickly vanish before the warm rays of the sun. This cold air often flows into valleys and fills them with a level sea of white fog, which presents a striking aspect when seen from a mountain-elevation.

Warm ocean-currents are very apt to produce fog.

is is markedly the case with the Gulf Stream, whose
nperature, in its northern regions, is considerably
ester than that of the atmosphere. To its pre-
sence are due the dense fogs of the Banks of New-
undland. Behring's Sea is often very foggy from a
ne cause. Long, narrow lines of fog are produced in
e line of contact of the cold Arctic with the warm
utherly winds. Icebergs and Arctic ice-fields also
oduce fogs by chilling the warmer air that blows
er them. A fleet of stranded bergs on the coast
Greenland is apt to destroy all hopes of a har-
rvest by the incessant fogs it produces. The warm
ist winds which blow over North-western Europe
ld frequent fogs by their contact with the colder
nd-surface. Similar causes, intensified by the warm
r constantly rising from cities, yield fogs of unusual
nsity, of which those that occasionally occur over
ndon are particularly notable.

Observations made upon mountains and in balloons
tablish the fact that there is no fundamental differ-
ce between a fog and a cloud, and lead to the assump-
n that their causes are essentially the same. These
uses are the following: 1. Radiation of heat from a
ss of moist air to the upper sky, through which the
becomes chilled and its vapor condensed; 2. The
inity of cold ground, particularly of mountain-sum-
s; 3. The cooling effects of expansion when rising
scends into regions of lower pressure; 4. The
ntact and mixture of warm with colder air. The
second and third of these causes is that the excessive
rainfall of mountainous regions. In the action of
fourth it might be supposed that the mixture of
ated hot and cold air would yield an equally moist
d compound at intermediate temperatures; but such
ot the case, since the saturation-capacity of air in-
ases in a geometrical, while temperature rises in an
thmetical, ratio. Thus a cubic foot of air at 72° can
l 15.7 grains of water; one at 32° may contain 2.1
ins. A cubic foot at 62°, arising from a mixture of
above, would contain 8.9 grains. But the satura-
-capacity at 62° is only 6.2 grains; hence from such
ixture there would result an excess of 2.7 grains
cubic foot, which must condense into cloud or fall
rain.

he first attempt to classify clouds in accordance with
r apparent forms was made by Luke Howard, an
English meteorologist, in 1802. His nomenclature
ill retained. He divides clouds into four species—
cirrus, the stratus, the cumulus, and the nimbus—
distinguishes their intermediate forms or com-
nds of these; as, cirro-stratus, cirro-cumulus, and
ulo-stratus. The nimbus, or rain-cloud, is often
designated as cirro-cumulo-stratus, or as a com-
nd of all three of these forms. Of course this
ification can be but partial, since clouds present
extensive variety of intermediate conditions, be-
en the faintest cirrus and the heaviest nimbus. A
r author, Rev. W. C. Ley, points out that there
really but two fundamental varieties of cloud, the
ical and the horizontal, and that all intermediate
ns arise from various combinations of these. These
forms occur at all altitudes and all times, but the
izontal clouds are more commonly those of the
ht, of the winter, and of the sea; the vertical
e of the day, of the summer, and of the land.
he cirrus is the fibrous, wispy, or feathery cloud,
"curl-cloud" or "mares'-tails" of sailors. It
t at the highest elevation. They may exist—as
, indeed, all cloud-forms—at a far greater

mation of a cumulus cloud. If its borders are sharply defined and its color is white, fair weather is likely to continue; otherwise, rain is likely to fall, and often with the accompaniment of thunder and lightning. Some writers believe that the similarly electrified state of the cloud-particles causes them to repel one another. When, by a lightning-flash in any direction, the electrization is neutralized, drops form and rain descends; this may explain the sudden dash of rain which often follows a flash of lightning. Finally, the cloud dissipates, leaving only streaks of cirrus in the upper air and some flecks of scud below. The cumulus often forms without a shower, forming, as Tyndall expresses it, the capital of a vast column of ascending warm air. This dissolves at night or subsides into loose stratus. The cumuli are most frequent in summer, when they are apt to appear and grow in the morning, attain their highest elevation at the warmest hour of the day, and descend afterward. Their thickness is from 1300 to 1700 feet; their height, from 1500 to 10,000. At night the clouds descend nearest to the ground.

Clouds are very mobile and readily move before the winds; yet there are some which do not progress. These are such as the mountain-streamers or caps, and banks of cloud suspended over water from which rises a stream of moist air. On such clouds a heavy wind seems to have no effect. They are, in reality, constantly dissipated and constantly renewed. The moisture of the warm air grows visible on touching the cold peak or on account of the passage of the cold wind through it.

As to the distribution of clouds, it depends entirely upon the distribution of saturated air and the existence of conditions favoring rapid variations in aërial temperature. These conditions occur most commonly over the oceans and the contiguous portions of continents, and least so in the continental regions farthest removed from the ocean whence come the prevailing winds. If mountain-chasms intervene, the result is most pronounced. The winds are drained more and more of their moisture as they pass inward, so that more rapid and extreme variations of temperature are necessary to produce cloud and rain; and eventually they become so dry that no change of temperature can cause a condensation of their remaining moisture. These are the regions of cloudless skies and desert soils. Elsewhere the cloud conditions depend largely on the direction of the wind. On our Atlantic coast, for instance, the north-east are the cloud-bringing winds; the north-west, the precursors of clear skies. The southerly winds are intermediate in results, as are other combinations. (C. M.)

CLOVER. See FORAGE CROPS.

CLUSERET, GUSTAVE PAUL, a French soldier and Communist, born in Paris, June 13, 1823. He was the son of a colonel of infantry in the French army, and was entered at the military school of St. Cyr in 1841. After finishing his course he was appointed sub-lieutenant, and in 1848 was a full lieutenant. He took part with the Garde Mobile, and as commander in the Twenty-third battalion was distinguished in the attack on the barricades. On the 28th of July he received the decoration of the Legion d'Honneur. In 1850 he was a lieutenant in the Fifty-fifth regiment of the line, and when the *coup d'état* was made he, with more than a thousand other officers, was suspended from active service. In 1855 he was appointed a captain of chasseurs and attached to the Arabian bureau of Algerian affairs, in which he was active and valuable. His restless spirit, however, caused him to resign and join Garibaldi in his efforts for Italian independence. In this service he was promoted, after the taking of Capua, to the rank of lieutenant-colonel, and upon the conquest of Sicily and the capture of Naples he was transferred to the staff. At the first sounds of the civil war in the United States he resigned and embarked for America, where he espoused the Union cause, and served as aid to Gen. Fremont and Gen. McClellan, attaining the rank of brigadier-general of volunteers. In 1864 he established a newspaper in New York in the interest of Gen. Fremont's candidacy for the office of President. This enterprise came to an end when Gen. Fremont withdrew his name in favor of Mr. Lincoln, and in 1866 Cluseret returned to Europe to join the Fenians. In the attack on Chester Castle in 1867 he is said to have taken part under the assumed name of Aulif. He escaped to France, but, notwithstanding his vehement denial, he was condemned to death by the English courts, upon his non-appearance, for contumacy. In Paris, where he took up his residence, he wrote articles for the *Courrier Français* on the situation in the United States, which attracted attention, and political papers in a journal called *L'Art*, which he established. These latter were condemned by the Government, and he was detained for a time in Sainte-Pélagie. While there he conspired with the leaders of the International Commune. He was soon released, and in 1869 he issued, in the pages of *La Democratie*, *Le Rappel*, and *La Tribune*, a series of violent articles on the condition of affairs in France, and especially on the organization of the army. Upon the issue of a warrant to apprehend him, it was found that he was a naturalized citizen of the United States, and as such he claimed the protection of Mr. Washburne, the U. S. minister. He was ordered to leave France. He was now fully embarked in the International cause, and upon the fall of the Second Empire in 1870 he declared that the fortunate chance for the Commune had arrived—that they must have Paris or destroy it. The revolution of Sept. 4 brought him back to Paris, where he at once assumed the charge of the paper called *La Marseillaise;* but an article called "La Reáction," directed against the Government of the national defence, caused him to be repudiated by his own partisans; even Rochefort denounced him. Thereupon he retired from Paris to take part in the insurrection at Lyons. Thence he went to Marseilles, where he proclaimed himself as military commander in the south of France. Failing, by a large adverse majority, to be returned as member of the Assembly, he was on his return to Paris elected a member of the Commune, but in his dealings with his party he was so haughty, dogmatic, and extreme that he was deposed and arrested. He was confined at Mazas, and only liberated when the French army entered Paris and overthrew the Commune on the 24th of May. He was then concealed for five months by a friendly priest, and in November contrived to escape, first to England, and thence to America. The third council of war condemned him to death for contumacy on Aug. 30, 1872. His principal work, entitled *The Army and Democracy*, was published in 1869. (H. C.)

CLYDE, a village in Sandusky co., Ohio, is at intersection of the Lake Shore and Mich Railroad with the Ohio division of the Louis, and Pacific Railroad, and on the Lake Erie Railroad, 17 miles S. W. of has a bank, three hotels, six chur a weekly and a bi-weekly newspa

periodicals. It has two grain-elevators, two flour-mills, an organ-factory, and manufactures of cutlery, etc. Gen. James B. McPherson was a resident of this village, and there is a fine bronze statue of him in the village cemetery. Population, 2380.

CLYDE, a town of New York, in Wayne county, and in the township of Galen, is on the New York ilroad, and on the Erie Canal, 38 miles W. It is also on the New York, Buffalo and Railroad. It has a weekly newspaper, rches, a free reading-room, a union school, an , two hotels, and two banks. Its industries manufactures of glass, farm-implements, r, lumber, and steam-engines. There are also six houses and a fruit-cannery. Population, 2826.

COADJUTOR is the name give in the Roman Catholic Church, to a clergyman appointed to assist a bishop in the performance of his episcopal duties. He is named by the pope at the personal request of the one needing an assistant, or on the nomination of the prelates of a province. He receives the episcopal consecration and the title of a see *in partibus infidelium*. The principal reasons for asking for a coadjutor are age, infirmity, extent of territory, extraordinary increase of population, other offices in the service of the Church or State. When the coadjutor-bishop is appointed "with future succession," he is properly called "coadjutor;" but when appointed merely during the lifetime of the senior prelate, to relieve him of some of the burdens of governing his diocese, he is more properly called a "bishop suffragan" or "bishop auxiliary." (R. S.)

COAL.

THE earliest record of coal in America is by Father L. Hennepin in his *New Discovery of a Vast Country in America* (London, 1698). On the map prefixed he marks a "cole-mine" above Fort Crevecœur, on the Illinois River, near the site of the present city of Ottawa. "In this country," he says, "there are mines of coal, slate, and iron," evidently referring not to workings, but to beds of these substances appearing on the surface. The first coal-working in America was in the Richmond (Va.) coal-field about 1750. In 1775 and during the Revolution this fuel was used in the Richmond forges which made arms and ammunition for the American army, but it does not appear to have been sent away from that region before 1789, when shipments were made to Philadelphia, New York, and Boston. This coal was quarried from banks exposed to daylight. The Rhode Island anthracite was known in 1760, but the Portsmouth mine, which appears to have been the first, was not opened until 1808. Pennsylvania anthracite was known as early as 1766, and was used in 1768 by two blacksmiths named Gore who had been familiar with the use of coal in England. Settling in the Wyoming Valley, they found coal cropping out on the hillsides, and used it successfully in their forges. In 1776 several boatloads of anthracite coal were sent from Wyoming down the Susquehanna, and thence hauled to the Carlisle Barracks to manufacture arms. This practice was kept up during the Revolutionary War, and after that anthracite continued in use by the blacksmiths in the neighborhood of the Susquehanna; but it was not used for domestic purposes till 1808, when Judge Jesse Fell of Wilkesbarre made an experimental grate of hickory withes, and found he could get a satisfactory open grate-fire of anthracite. He then made an iron grate, and used it habitually.

See Vol VI. p. 43 Am. ed. (p. 45 Edin. ed.).

In 1791 coal was discovered at Summit Hill in the Lehigh district by Philip Ginter, a hunter, and in the following year the Lehigh Coal Company was formed by Rob Morris, the distinguished financier of the A. Revolution, and a number of his friends. T ug out the coal, and in the course of years got as far as Philadelphia, but it would not sell because it could not be burned. Some of it was purchased by the city of Philadelphia for the use of a steam-engine at the corner of Broad and Market Streets, but n wn on the paths of the streets with the "stone fuel" or "stone coal" continued, and the owners of the lands containing it persisted in trying to force its use. They remained without success until 1812, when Col. George Shoemaker took nine wagon-loads of coal from the Schuylkill region, near Pottsville, to Philadelphia. Like his predecessors, he had great difficulty in selling his coal, but finally disposed of two or three loads at the cost of hauling, and left the rest with different persons for experiment. One load went to the Fairmount Wire and Nail Works, where the workmen spent a whole forenoon in fruitless attempts to start a fire with it. At last they closed the furnace-doors and went to dinner; returning an hour later, they found the doors red hot and the furnace all aglow. After that there was no more trouble in either burning or selling anthracite.

In 1814, Charles Miner sent an ark loaded with 24 tons of coal from Mauch Chunk, *viâ* the Lehigh and the Delaware, to Philadelphia, and in 1820, when the navigation of the former river was improved, 365 tons were shipped and the trade fully established. Two years later the Schuylkill Navigation Company transported by their canal to Philadelphia 1480 tons. We find in 1829 the Delaware and Hudson Canal shipping 7000 tons; in 1833, the Union Canal of Pennsylvania 3500 tons; in 1834, the Lykens Valley Coal Company 4780 tons; and in 1839, the Shamokin Valley Coal Company 11,390 tons.

Coal in the United States.

The coal-deposits of the United States (Plate VIII.) exceed in area, in the quantity of coal contained, and in the variety and general excellence of their fuel, those of any other country in the world. The coal ranges from the hardest anthracite—which, indeed, is found in perfection only here—through all the gradations down to lignite and peat, while much of the lignite, which covers an immense portion of the Western States and Territories, is so far superior to the lignites of the Old World that it has been assigned to a separate class and called "lignitic coal."

Distribution and Species.—The main deposits of *anthracite* coal are situated in Eastern Pennsylvania, but this variety is also found in Massachusetts and Rhode Island, Virginia, North Carolina, and Arkansas. Some of the lignitic coals of Colorado and New Mexico are similar to anthracite in analysis and appearance.

Bituminous coal occurs in Pennsylvania, Maryland,

Virginia, West Virginia, Ohio, Kentucky, Tennessee, Georgia, Alabama, Arkansas, Missouri, Indiana, Illinois, Iowa, Michigan, Kansas, Nebraska, Indian Territory, and Texas.

Cannel coal is found in Pennsylvania, Virginia, Kentucky, Ohio, Indiana, Illinois, and Missouri; and *lignitic coal* in different forms, from anthracite and bituminous to ordinary lignite, occurs in most of the States and Territories west of the 100th meridian of longitude, especially in Colorado, Wyoming Territory, New Mexico, Arizona, Utah, Montana, California, Oregon, and Washington Territory; also in Mexico.

Lignite is found in Vermont and many Western States and Territories. No coal occurs in Maine, New Hampshire, New York, New Jersey, Delaware, South Carolina, Florida, Mississippi, Louisiana, Minnesota, or Wisconsin.

Anthracite.

Anthracite in Pennsylvania.—The principal deposits of anthracite are found in Pennsylvania (Plate IX.), where they occupy three closely-connected fields in the eastern section of the State. Their total area is 472 square miles, and the number of workable beds or "veins," as they are popularly but incorrectly called, fifteen, with a total thickness of 107 feet of coal; while the thickness of the measures with which the beds are interstratified is about 3000 feet. There are many smaller beds of coal in the same section, some of them containing fuel of a very good quality, but it is the rule to count no bed which is less than 2 feet in thickness.

The three Pennsylvania anthracite coal-fields are known, respectively, as First, Second, and Third, Southern, Middle, and Northern, or Schuylkill, Lehigh, and Wyoming; and in general use one of these sets of names is about as common as another.

The First, Southern, or Schuylkill field contains basins extending from a point near Mauch Chunk, on the Lehigh River, westward a distance of 44 miles to a bifurcation of the Broad Mountain, where it divides into two prongs, continuing nearly in the same direction, one of which is 15 and the other 25 miles long. The width varies, but averages about 2 miles. Total area, 138 square miles. A smaller basin, separated from the main body by a dividing ridge called the Mine Hill, contains 8 square miles.

The Second coal-field consists of long basins parallel with the First and about 10 miles north of it, called the Mahanoy and Shamokin region, and a number of small detached basins north-east of this, known as the Lehigh region. The total area of this field is 38 square miles.

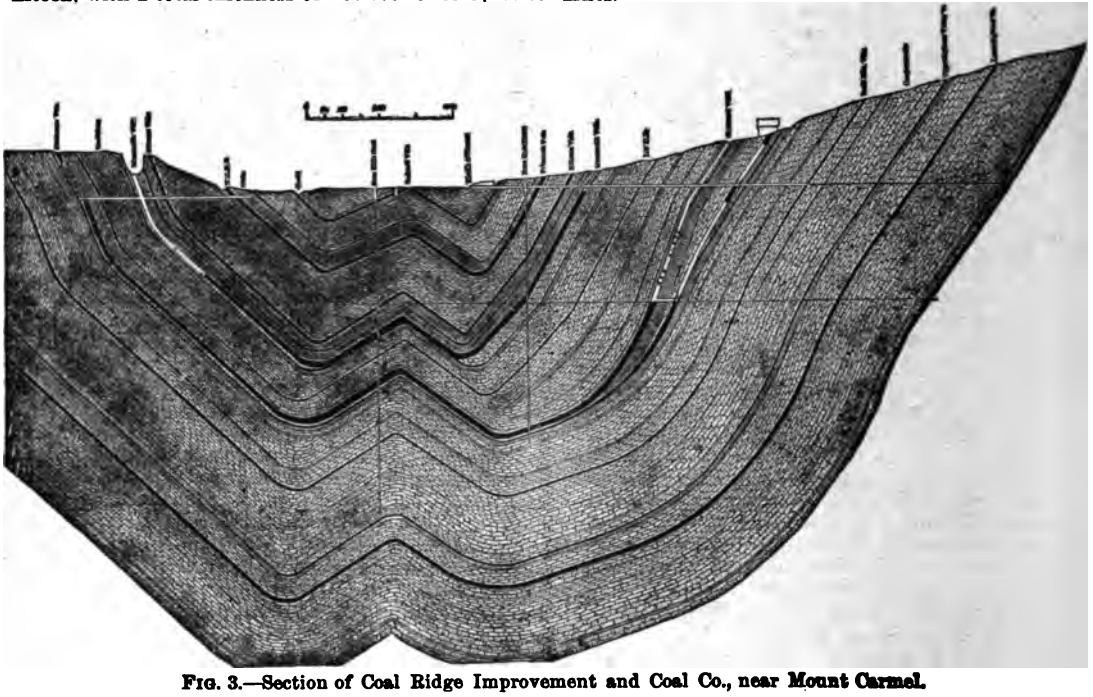
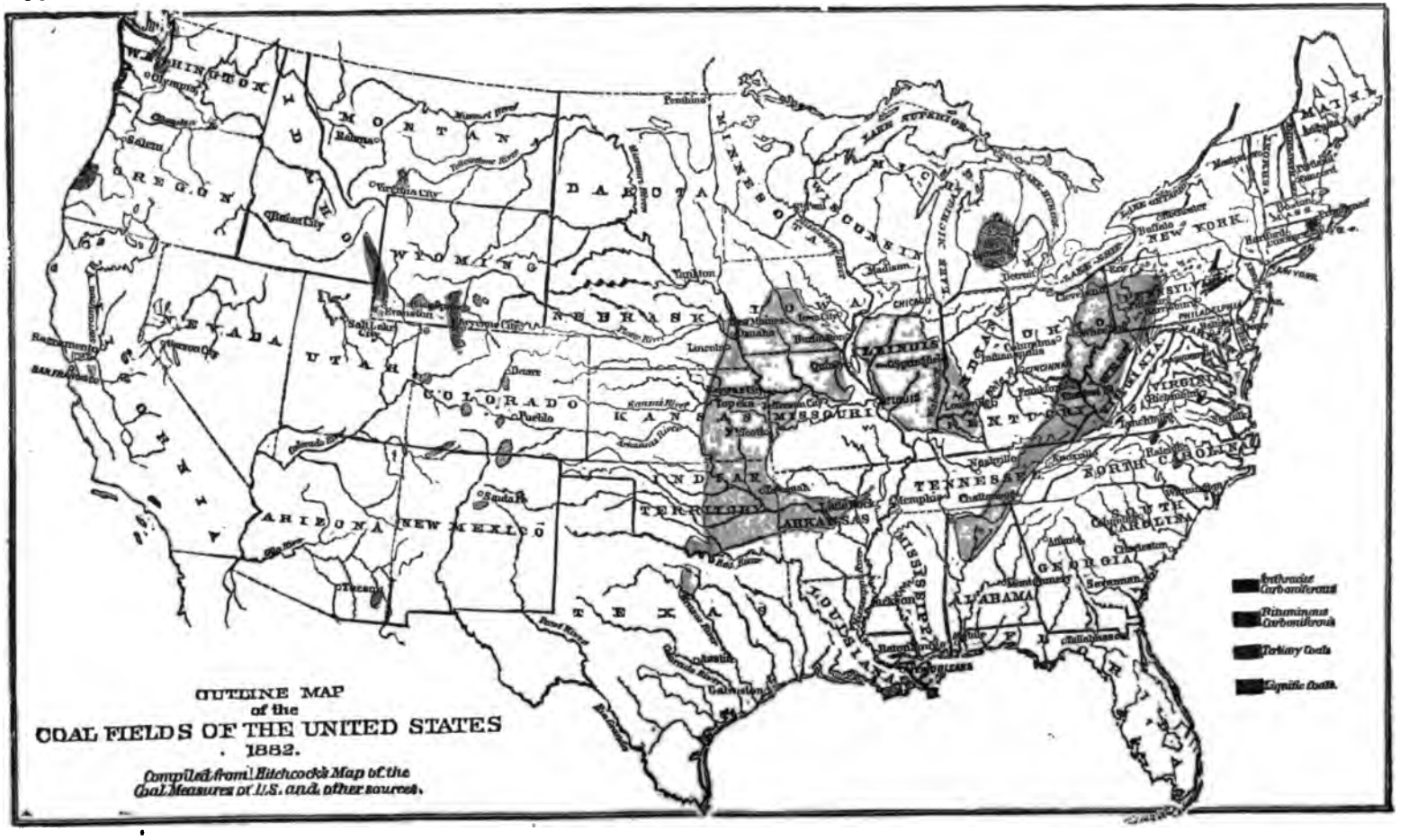
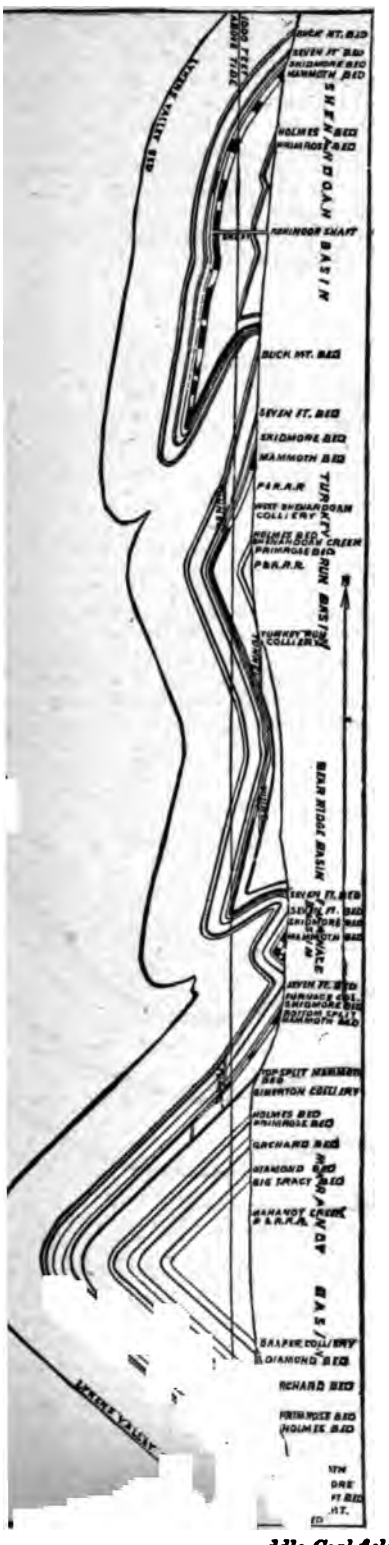


Fig. 3.—Section of Coal Ridge Improvement and Coal Co., near Mount Carmel.

The Third field occupies the valley of the Lackawanna River and a part of that of the Susquehanna. It is of crescent shape, and is comparatively regular both in outline and in the arrangement of its beds. This field is about 50 miles long, with a greatest width of 5 miles, tapering almost to a point at each end. Its total area is 198 square miles.

Comparisons.—In popular speech it is usual to consider these coal-fields as divided by geographical rather than geological lines; and there is some warrant for this in the character of their respective coals and the disposition of the beds. The coal of the Northern field is of nearly uniform quality, and, as before stated, comparatively regular in the dips and flexures of the beds; that in the Middle field is also of nearly uniform quality, though more disturbed in position (see fig. 3), as the detached basins of the Lehigh district, but changes gradually as it goes westward in the Mahanoy region, until the Shamokin coal, at the western end of the field, is a semi-anthracite, a quality between anthracite and bituminous, possessing in some respects the better characteristics of both. In the Southern field the beds are disturbed, and the coals vary greatly in quality and characteristics. They, however, follow the general law


OUTLINE MAP
of the
COAL FIELDS OF THE UNITED STATES
1882.
Compiled from Hitchcock's Map of the Coal Measures of U.S. and other sources.
Anthracite Carboniferous
Bituminous Carboniferous
Tertiary Coals
Cretaceous Coals



dle Coal-field, in

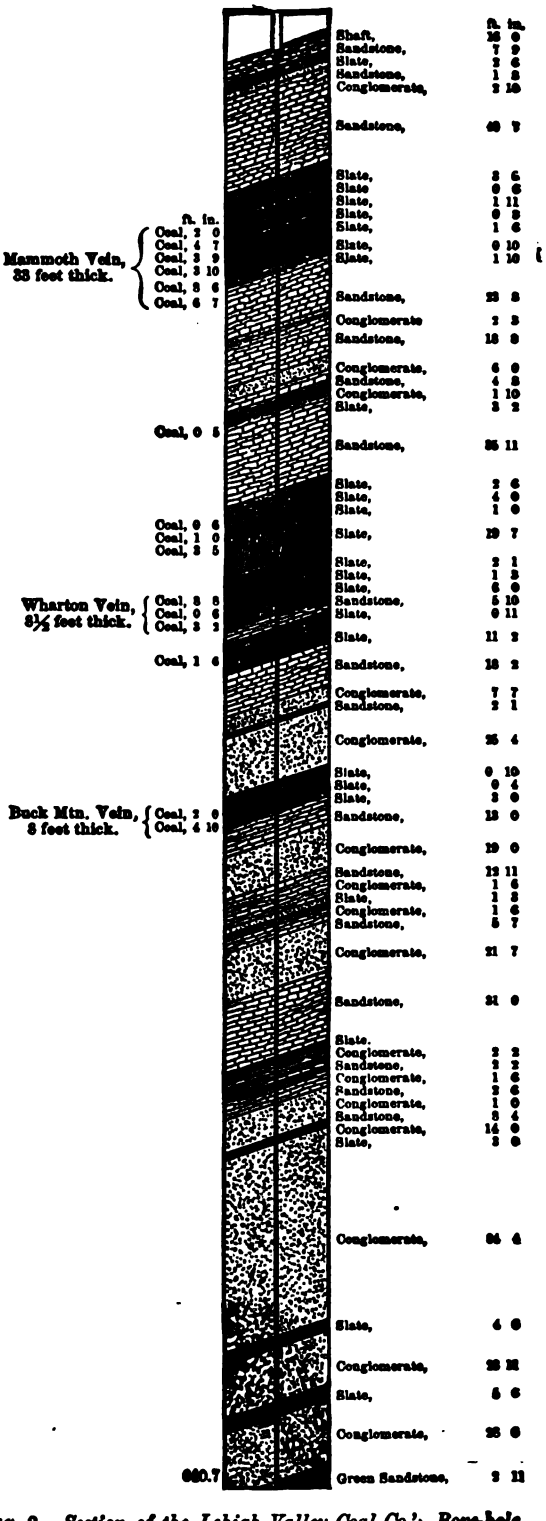


FIG. 2.—*Section of the Lehigh Valley Coal Co.'s Bore-hole, No. 19, near Hazleton, Pa., June, 1876.*

observable in the Middle field, of hard, pure anthracite at the eastern end, changing gradually to a softer anthracite at the western. It is only at the western ends of the Southern and Middle fields that the lowest coals of the series are found in workable condition. These are classified by some authorities as a single bed, and marked as "A," or the beginning of the series; but in Dauphin and Northumberland counties they are two regular beds, averaging, respectively, 3 and 8 feet in thickness, and yielding a product well known in all anthracite markets as Lykens Valley coal. This coal is soft, easily ignited, and burns freely, but without the smoke and odor of bituminous coal. The average of thirty analyses made by State-Geologist Prof. H. D. Rogers, Profs. R. C. Taylor, W. R. Johnson, J. C. Booth, M. C. Lea, and Dr. Ellet, of samples taken from these beds at Wiconisco shows the specific gravity of their coal to be 1·397; their percentage of carbon, 83·30; volatile matter, 10·42; and ash, 6·11.

The analyses by the same authorities of twenty samples of Lehigh coal (hard, white-ash anthracite) average as follows: Specific gravity, 1·577; carbon, 89·25; volatile matter, 9·86; ash, 4·20.

The following are analyses of anthracite coals from beds in Schuylkill county:

TABLE I.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	Average.
Moisture	1·960	1·500	1·480	1·920	1·440	1·350	1·200	1·250	1·020	1·487
Volatile matter	3·240	3·600	3·220	3·480	1·460	0·530	2·640	1·410	2·970	2·494
Fixed carbon	86·372	83·619	85·316	88·032	93·502	96·199	89·576	90·985	88·147	89·093
Ash	9·300	11·250	9·700	6·330	3·360	1·900	6·250	6·020	7·200	6·701
Sulphur	0·128	0·031	0·284	0·238	0·238	0·021	0·334	0·334	0·663	0·252
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	99·987
Pounds of water evaporated by 1 lb. coal	11·12	11·70	8·82	10·34	11·00	10·36	10·60	10·40	10·10	11·89

Bed.

I. Little Tracy, 4 ft. 6 in. thick, from Ellangowan colliery.
II. Big Tracy, 7 " 2 " " " " "
III. Diamond, 11 " 6 " " " " "
IV. Orchard, 8 " 10 " " " " "
V. Primrose, 13 " 9 " " " Knickerbocker "
VI. Mammoth, 37 " 6 " " " Ellangowan "
VII. Skidmore, 4 " 0 " " " N. Mahanoy "
VIII. Seven-foot, 7 " 0 " " " " "
IX. Buck Mt., 13 " 0 " " " W. Shenandoah "

The Ashes Test.—Another method of distinguishing different varieties of anthracite—and a very important one from a commercial point of view—is by the color of the ash, which ranges from a pure white in some specimens to a deep red in others. The Lykens Valley coal, just mentioned, yields a light-red ash. Overlying this are four beds of white-ash coal, forming the next or middle number of the series. Then comes a valuable bed of gray-ash, and then a red-ash group.

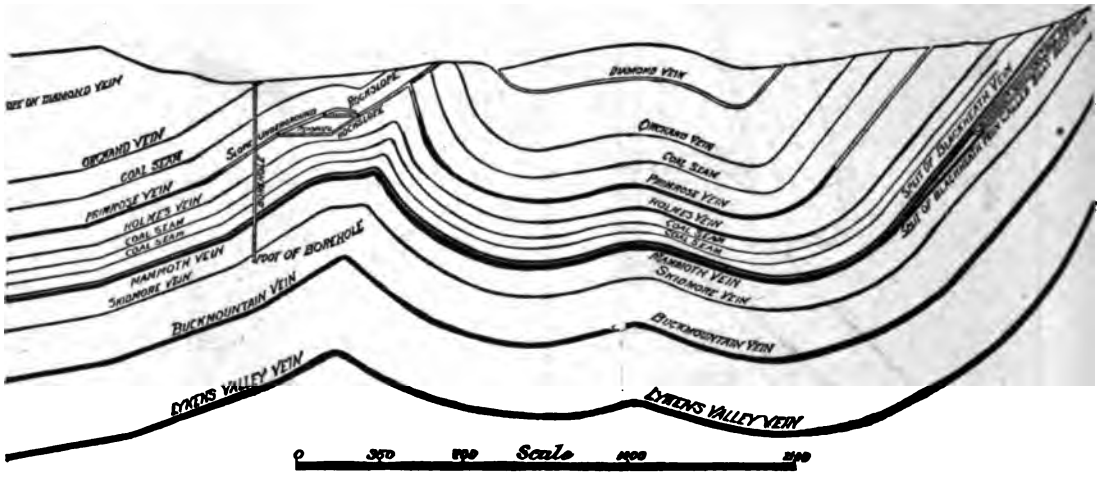
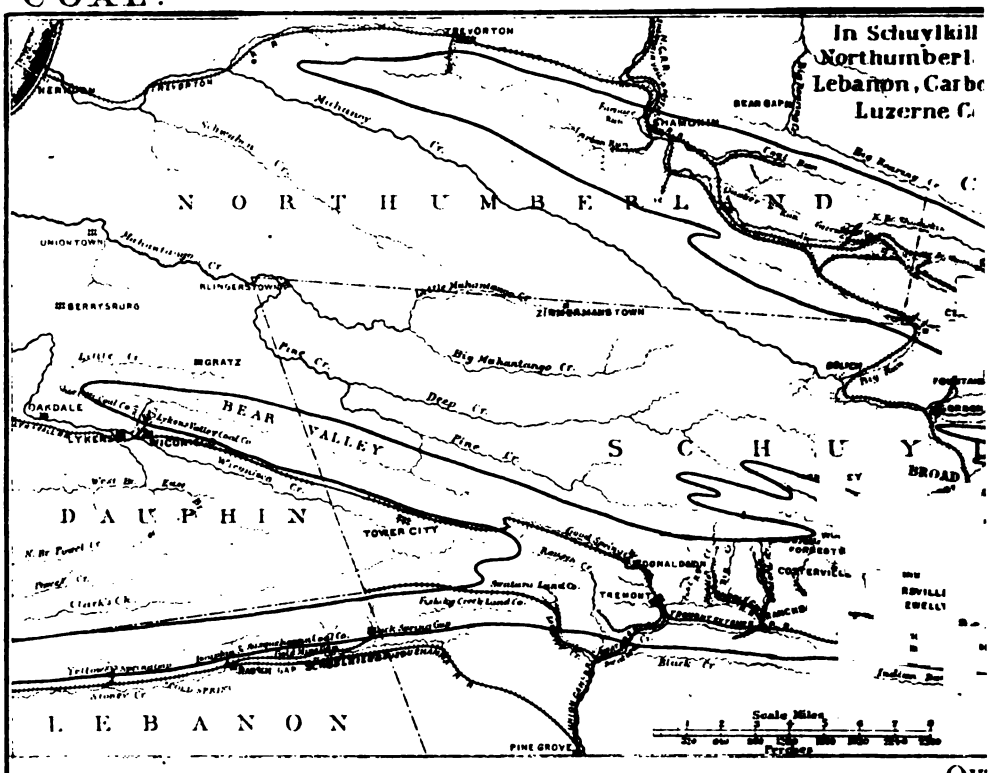


FIG. 4.—Coal-veins at Phœnix Park, Schuylkill co., Pa.

(See fig. 4.) The color is due to the presence of ferric oxide; and this, in turn, is supposed to have been diffused through the air by volcanic action, to be deposited by rain in the forming coal-beds. Prof. Greene (*Coal, its History and Uses*, p. 63) traces the coloring of the red sandstones to the same source. The well-known intermittent character of volcanic discharges will perhaps account for the coloring of the lowest coals, the absence of color in the middle series, and the deep tint of the ashes of the upper beds; especially when it is considered that the upper beds are thousands of years younger than the lowest ones, and that, as Prof. Greene points out, volcanic action is apt to be most intense when the volcano is about expiring. The commercial importance of the coloring-matter in coal-ashes is due, not so much to its presence or absence as to its furnishing an (apparently accidental) indication of the grade of the coal. All white ash anthracites are hard and well adapted for use in blast-furnaces and other fires which require intense heat and great resisting power in the fuel. They all contain a high percentage of carbon, with but little ash, and neither crumble nor cake in the hottest fire. The red-ash coals, on the other hand, are softer, crumble

COAL.



Ou

WYOMING & LACKAWA

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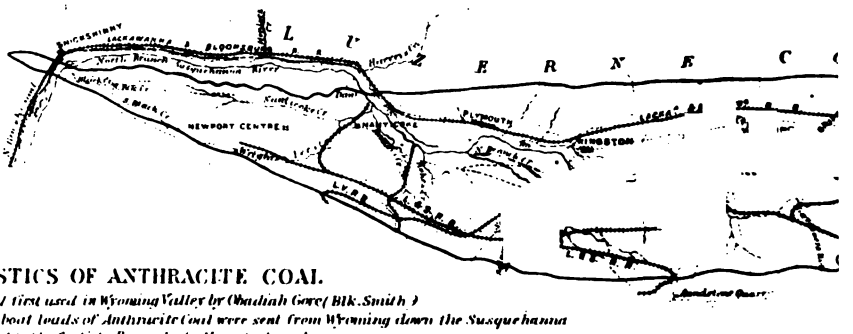
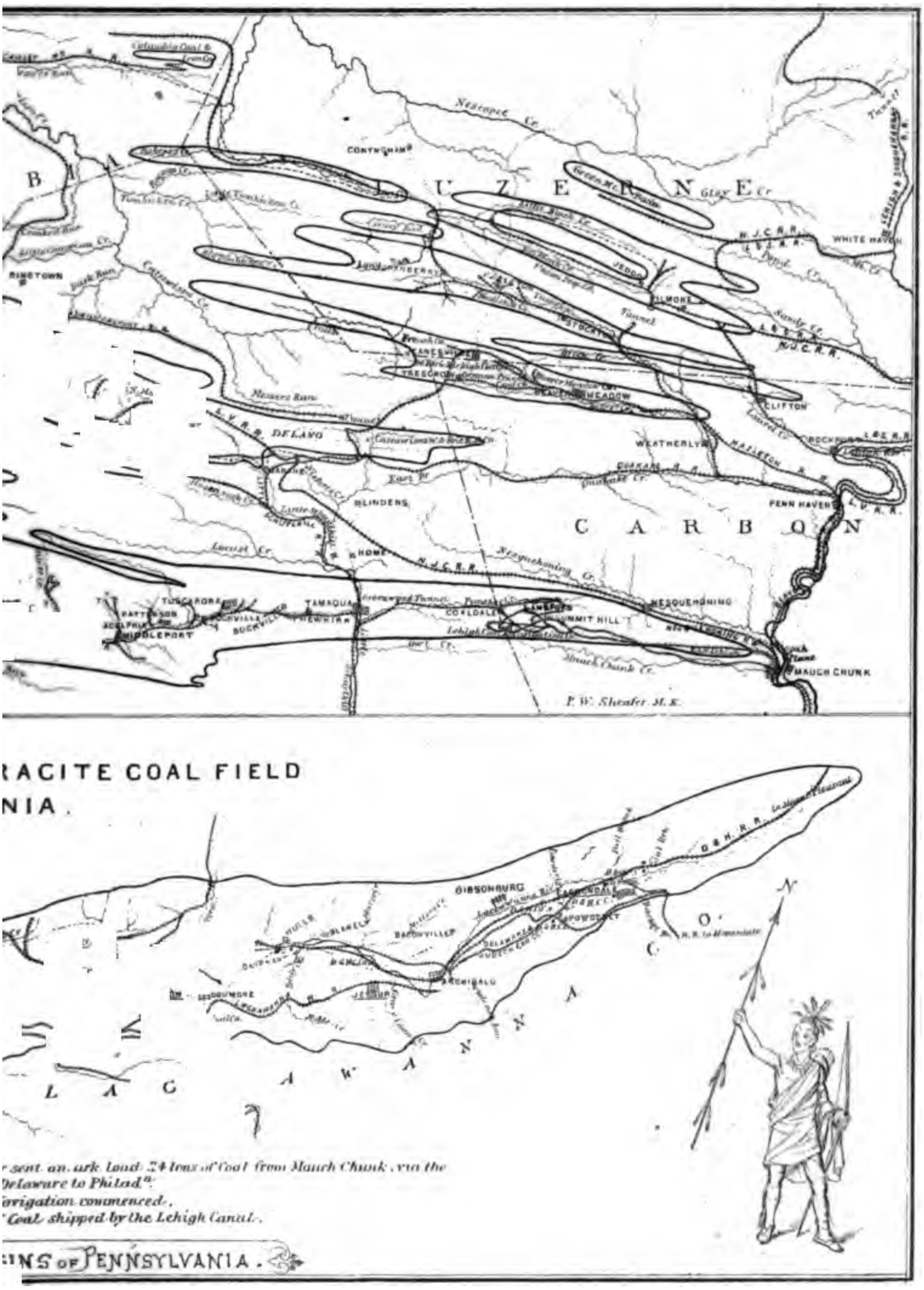


STATISTICS OF ANTHRACITE COAL.

1768. Anthracite Coal first used in Wyoming Valley by Obadiah Gore(Blk. Smith)
1775&1776 Several boat loads of Anthracite Coal were sent from Wyoming down the Susquehanna Schuylkill to the Carlisle Barracks to Manufacture Arms
1791 Coal first known in Schuylkill County
1794 Blak. Smith's used it in Schuylkill County
1808 Used in Grates by Judge Fell of Wilkesbarre .
1812 Col. Gen. Shoemaker hauled nine Wagon loads of Coal from Pottsville to Philad[a] and gave away the Coal .

OUTLINE MAP OF THE ANTH

PLATE IX.


RACITE COAL FIELD
NIA.
L U Z E R N E
C A R B O N
L A C K A W A N N A
CONYNGHAM
WHITE HAVEN
JEDDO
GILMORE
WEATHERLY
CLIFTON
PENN HAVEN
DELANO
TAMAQUA
TUSCARORA
MIDDLEPORT
COALDALE
SUMMIT HILL
NESQUEHONING
MAUCH CHUNK
Nescopec Cr.
Nesquehoning Cr.
Mauch Chunk Cr.
P. W. Sheafer. M. E.
GIBSONBURG
CARBONDALE
ARCHIBALD
JERMYN
sent an ark load 24 tons of Coal from Mauch Chunk, via the
Delaware to Philad^a.
avigation commenced.
Coal shipped by the Lehigh Canal.
INS OF PENNSYLVANIA.

and have a tendency to melt in a hot fire; and ade of color in the ash is a pretty good indication character of the coal in this respect.

ent of the Deposits.—It is probable that the pres- thracite fields of Pennsylvania are but the rem- of a great body of coal which once included them l filled up the spaces between them, the missing as having disappeared through denudation. The 's observations of the geology of the district show iis ancient coal-field must have had an area of 2000 square miles, and, supposing that all the beds were coextensive with it, contained about),000 tons. The amount of coal available beginning of the historic period was about ,093,817 tons, of which 409,597,748 tons were and sent to market in the sixty years from 1820), inclusive, as shown in Plate X.

white-ash series of anthracite beds has four s—the Buck Mountain, Skidmore, Mammoth, s, or B, D, E, and F. (See fig. 4.) An- bed, 5 feet in thickness, called the Ross bed, en traced in some places, and named "C" by writers, but it is scarcely extensive or distinct to have a separate designation. (See figs. 6, 7,).) An outlying branch of the Mammoth bed is unted separately sometimes, and called the "Sev- ," from its usual thickness, but it is more prop- edited to the great bed with which it is imme- connected. The first in the group, B, or the Mountain bed, has received little attention as the First coal-field, where it averages 8 feet kness, though its coal is of good quality. In high region and the western end of the Third t becomes very important, being 16 feet in ss at the Buck Mountain mines, at the ex- eastern end of the Second field, and increasing of sometimes 25 to 30 feet in the cen- In the vicinity of Scranton, in the Third only 4 feet thick. On the other hand, its the Skidmore, Wharton (or D) bed, is 8 feet Scranton, and contains excellent coal; in the oy field it is usually 10 feet thick, while in the kill region it is but 6 feet thick, and its coal is o rough and slaty as to be unmarketable. The th bed (E) is the great bed of the anthracite re- produces much more of the coal sent to mar- all the other beds combined. (See fig. 5.) aries from 14 feet or less in the Scran- w 20 in the Wyoming, and from 20 to 40 m y district, and to much more in local en- , but its average thickness is 25 feet. It is u sought after by all miners, and other beds are l only when the section of the Mammoth within the or's territory is being exhausted. It yields a hard, ash coal of great purity, which is in demand for e use and for other purposes requiring a clear, hot The Holmes bed (F) lies about 100 feet above the th. It contains from 4 to 6 feet of hard, com- ort-grained, white-ash coal, well adapted for fur- The Primrose (or G) bed is 10 feet thick, uces a gray-ash coal, softer than that of the th, but excellent for housekeepers' use. Farther s bed becomes the famous Pittsburg bed (or H) ious coal-field.

f the Southern coal-field are shown ing cross-section of the Philadelphia adi Coal and Iron Co.'s shaft near Pottsville, II.). This shaft, near the south foot of antic axis of Mine Hill, is the deepest cut coal-measures of the United States, developing a greater thickness of coal-strata and coal-beds than any other shaft in the world. It is located on the east branch of Norwegian Creek, on a lateral branch of the Philadelphia and Reading Railroad, 96 miles by rail from tide-water at Philadelphia. Its mouth is 729 feet above tide-level. The shaft was sunk 108 feet to the Peach Mountain bed, 10 feet thick, one of the Upper red-ash coal series; thence down 431 feet, where the Little Tracy was found, 45 feet thick, much beyond its usual size; at 1100 feet the Diamond bed was cut, 16 feet thick, also much enlarged; at 1559 feet the shaft had passed through all the red-ash coal-beds to the Primrose or gray-ash bed, 17 feet thick, five feet more than its ordinary size; at 1600 feet, the bottom of the shaft, a bore-hole was put down 376 feet to the bottom of the Mammoth coal-bed, here 21 feet thick—making a total depth of 1976 feet, and cutting thirty-two coal-beds in all, twenty-three of which were over 2 feet thick—making

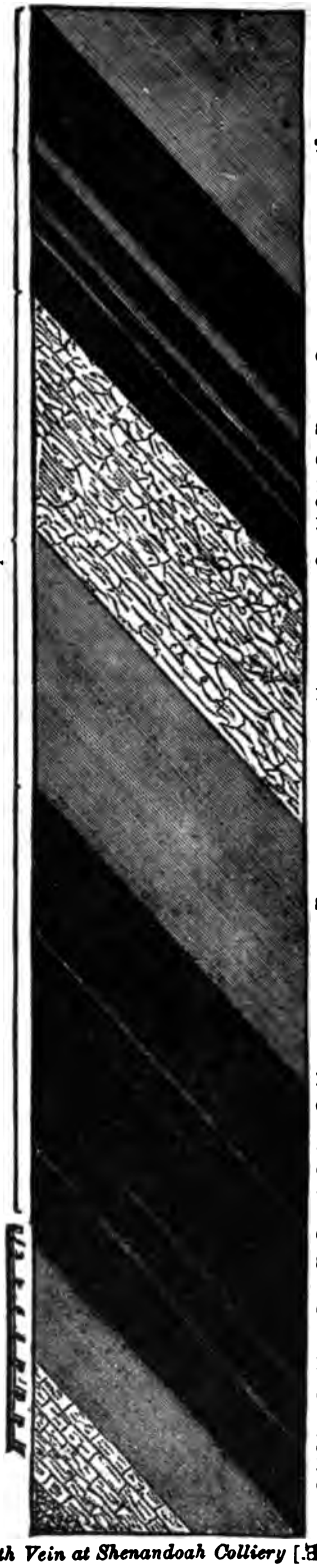
A total thickness of workable coal of	183 feet.
Also nine beds of coal below 2 feet	10 "
To which must be added the Skidmore and Buck Mountain beds (below the Mammoth)	15 "
Total	208 feet.

Statistics.—The following statistics of the Pennsylvania anthracite industry are taken from the report of the United States census of 1880, but are not believed to be strictly accurate. The number of collieries is too low, and the average output and acreage probably too high. The weights given have been reduced to tons of 2240 pounds, to agree with those used in this article:

Total number of separate establishments or collieries	273?
Average yearly capacity of production, tons	132,453
Average actual product in census year (ending June 1, 1880), tons	89,721
Per cent. of maximum capacity attained	67·28
Average capital leased, employed, and invested	$550,041
Average number of hands employed	250
Average amount of wages paid yearly	$79,414
Average value of materials used yearly	$23,598
Average number of acres of coal-land attached to colliery	604?
Ratio of value of yearly product to total capacity, per cent	26·86
Merchantable product for year ending June 1, 1880, tons	24,494,036
Value of product delivered for transportation	$40,331,981
Average value of same per ton for transportation	$1.65
Amount of coal washed, tons	1,247,237
Ratio of value of product to capital, per cent	26·86
Ratio of actual output to capacity, per cent	67·28
Tons raised yearly per man	405·7
Tons raised daily per man	1·90
Maximum yearly capacity of all collieries reported, tons	36,403,571

The capacity of production referred to means the probable output with present force and appliances.

The following summary, from the early census reports of 1890, will serve to show the increase in coal production, etc., during the last decade: Total production of anthracite coal during the calendar year 1889, 40,665,152 tons; number of employés, 125,229; total amount paid in wages, $39,152,124; quantity of coal shipped to market, 35,407,710 tons; quantity used in vicinity of mines, 4,848,276 tons; average number of working days 194; number of collieries, 342; value of product at mines, $65,718,165. The largest amount shipped in any one year (1888) was 38,145,178 tons.



MAMMOTH VEIN, UPPER MEMBER,
SEVEN-FOOT VEIN.

INTERVENING ROCK AND SLATE,
Increasing in thickness to 30 yards.

MAMMOTH VEIN, LOWER MEMBER.

Top slate.

Coal	3′	3″
Slate	1′	9″
Coal	2′	8″
Bony coal, slate	0′	8″
Coal	1′	0″
Bone coal and slate	0′	4″
Coal	3′	8″
Fine hard sandstone	12′	6″
Slate	12′	2″
Rough coal	0′	5″
Coal	2′	9″
Rough coal	0′	3″
Coal	2′	6″
Bony coal	0′	6″
Hard slate	0′	6″
Coal	2′	0″
Slate	0′	1″
Coal	4′	9″
Bone and slate	0′	9″
Hard slate	0′	5″
Coal	2′	6″
Slate	0′	5″
Coal	1′	0″
Rough coal	0′	3″
Coal	2′	7″

FIG. 5.—*Section showing Mammoth Vein at Shenandoah Colliery* [Heber S. Thompson, Eng. Girard Estate.]

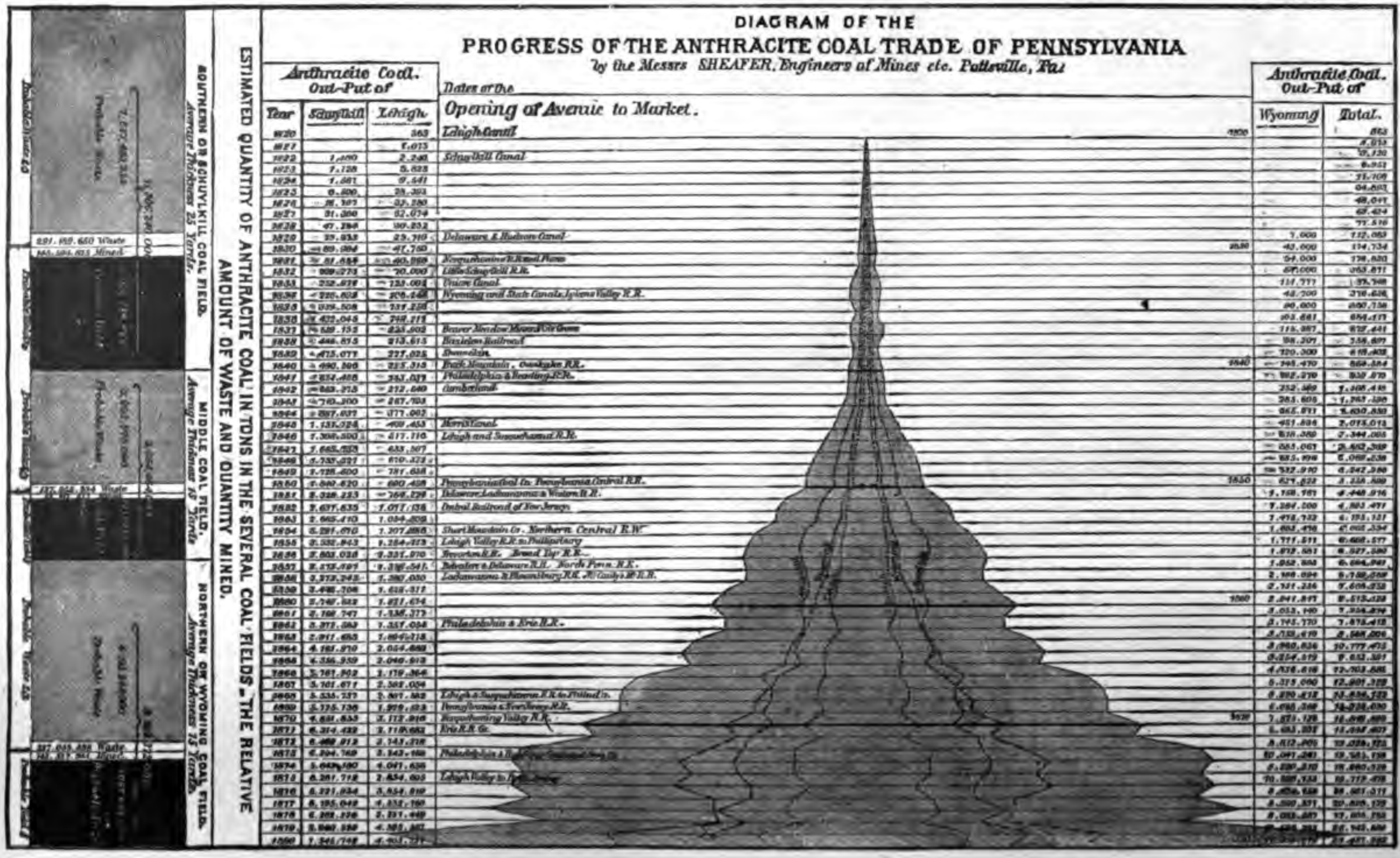
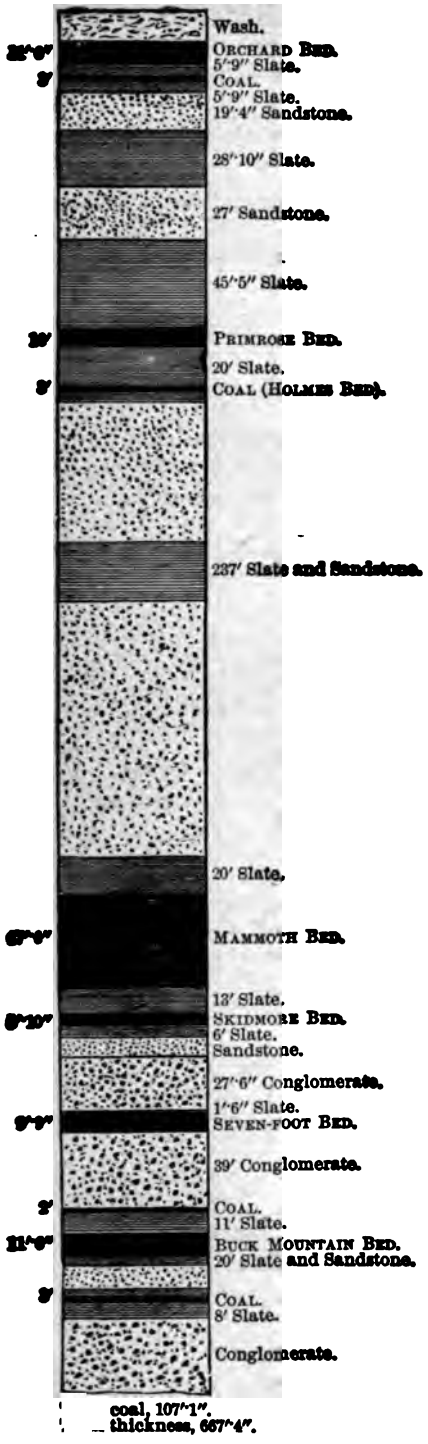
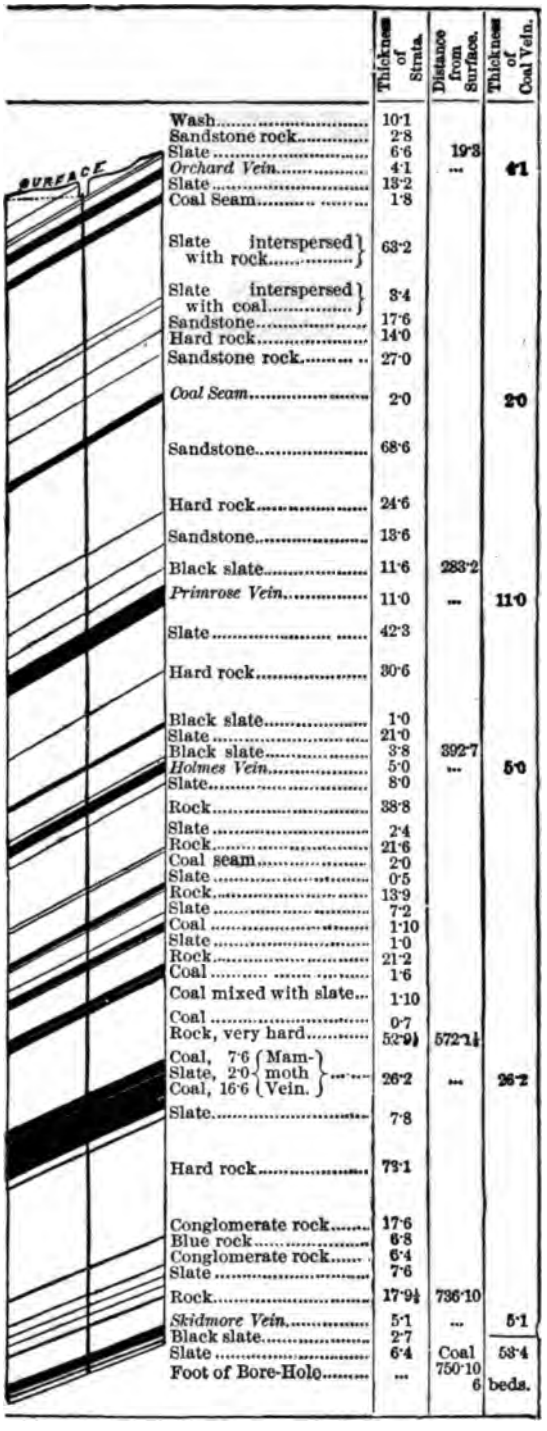


DIAGRAM OF THE
PROGRESS OF THE ANTHRACITE COAL TRADE OF PENNSYLVANIA
by the Messrs SHEAFER, Engineers of Mines etc. Pottsville, Pa.
Anthracite Coal. Out-Put of
Year
Schuylkill
Lehigh
Dates of the
Opening of Avenue to Market.
Anthracite Coal. Out-Put of
Wyoming
Total.
ESTIMATED QUANTITY OF ANTHRACITE COAL IN TONS IN THE SEVERAL COAL FIELDS _ THE RELATIVE AMOUNT OF WASTE AND QUANTITY MINED.
SOUTHERN OR SCHUYLKILL COAL FIELD. Average Thickness 25 Yards.
MIDDLE COAL FIELD. Average Thickness 15 Yards
NORTHERN OR WYOMING COAL FIELD. Average Thickness 15 Yards.



...mmar Section of Coal-Measures in the vicinity of ...leah, Schuylkill co., Pa. [by S. A. Beddall].



	Thickness of Strata.	Distance from Surface.	Thickness of Coal Vein.
Wash	10·1		
Sandstone rock	2·8		
Slate	6·6	19·3	
Orchard Vein	4·1	...	4·1
Slate	13·2		
Coal Seam	1·8		
Slate interspersed with rock	63·2		
Slate interspersed with coal	3·4		
Sandstone	17·6		
Hard rock	14·0		
Sandstone rock	27·0		
Coal Seam	2·0		2·0
Sandstone	68·6		
Hard rock	24·6		
Sandstone	13·6		
Black slate	11·6	283·2	
Primrose Vein	11·0	...	11·0
Slate	42·3		
Hard rock	30·6		
Black slate	1·0		
Slate	21·0		
Black slate	3·8	392·7	
Holmes Vein	5·0	...	5·0
Slate	8·0		
Rock	38·8		
Slate	2·4		
Rock	21·6		
Coal seam	2·0		
Slate	0·5		
Rock	13·9		
Slate	7·2		
Coal	1·10		
Slate	1·0		
Rock	21·2		
Coal	1·6		
Coal mixed with slate	1·10		
Coal	0·7		
Rock, very hard	52·9½	572·1½	
Coal, 7·6 / Slate, 2·0 / Coal, 16·6 (Mammoth Vein.)	26·2	...	26·2
Slate	7·8		
Hard rock	79·1		
Conglomerate rock	17·6		
Blue rock	6·8		
Conglomerate rock	6·4		
Slate	7·6		
Rock	17·9½	736·10	
Skidmore Vein	5·1	...	5·1
Black slate	2·7		
Slate	6·4	Coal	53·4
Foot of Bore-Hole	...	750·10	
		6	beds.

FIG. 7.—*Section of Coal-Measures Cut by Bore-Hole.*
(Scale 120 Feet to the Inch.)

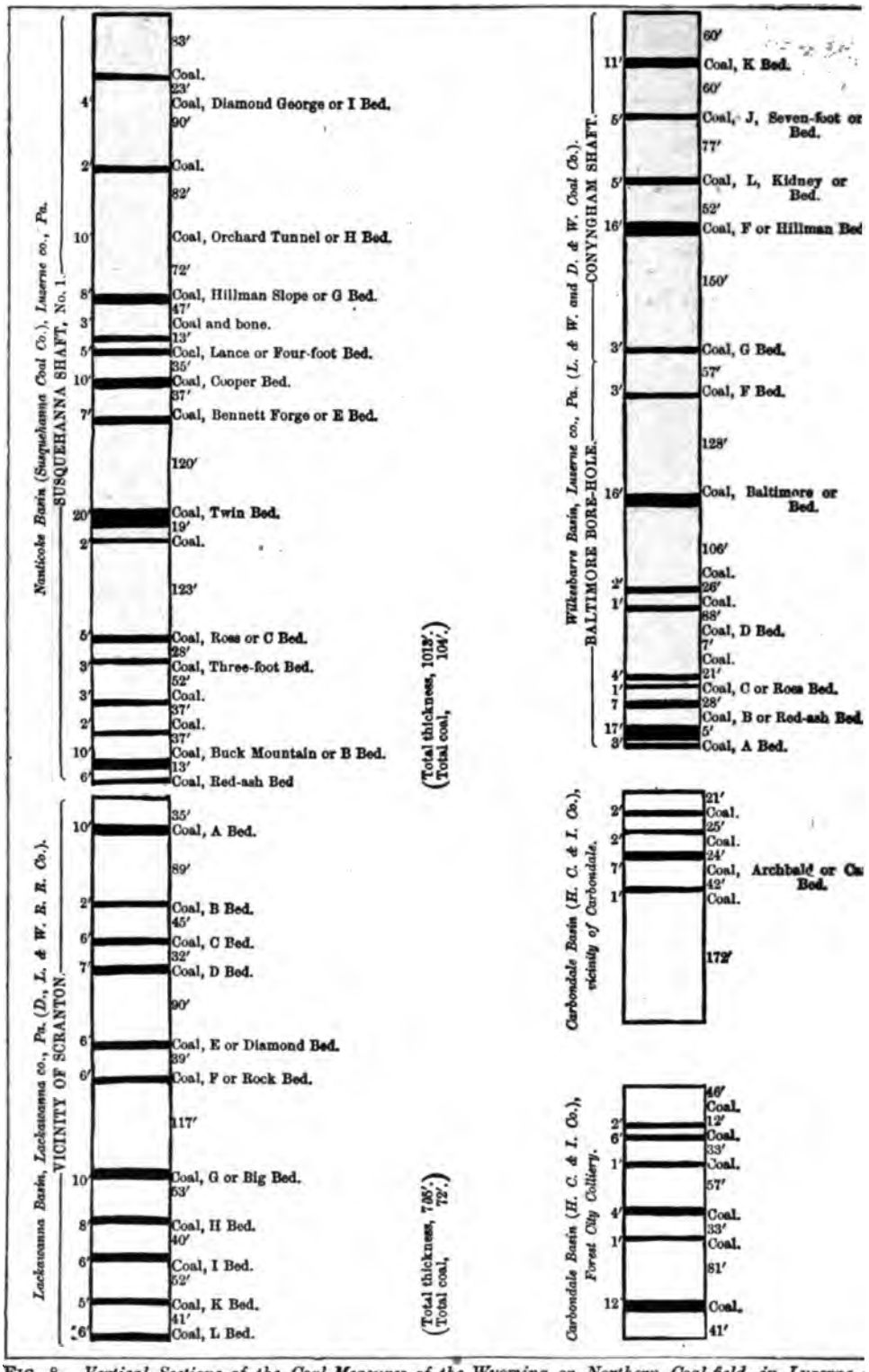


FIG. 8.—*Vertical Sections of the Coal-Measures of the Wyoming or Northern Coal-field, in Luzerne counties, Pa.* [published by permission of the Second Geological Survey of Pennsylvania, Charles A. A charge of the anthracite coal-fields].

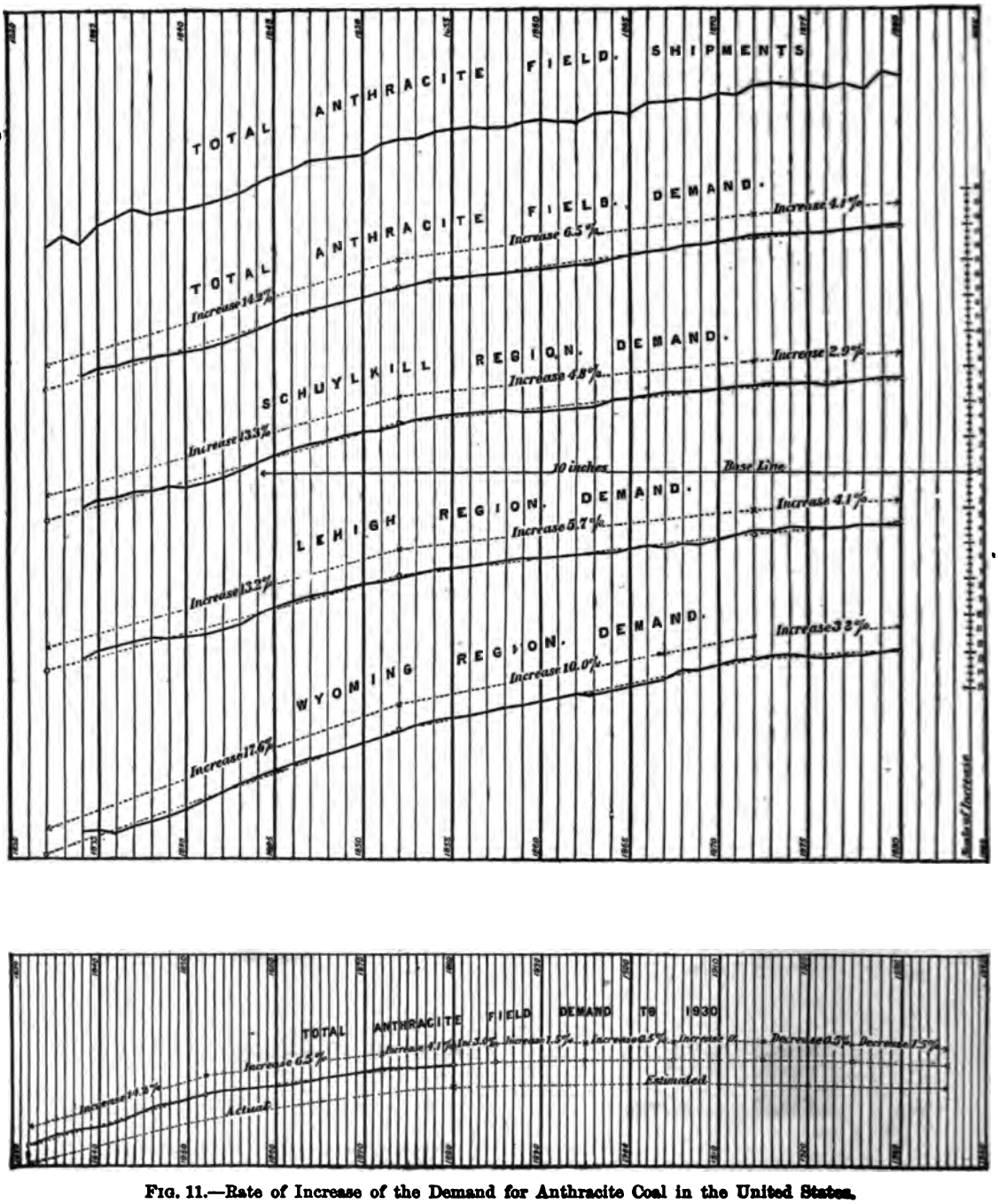
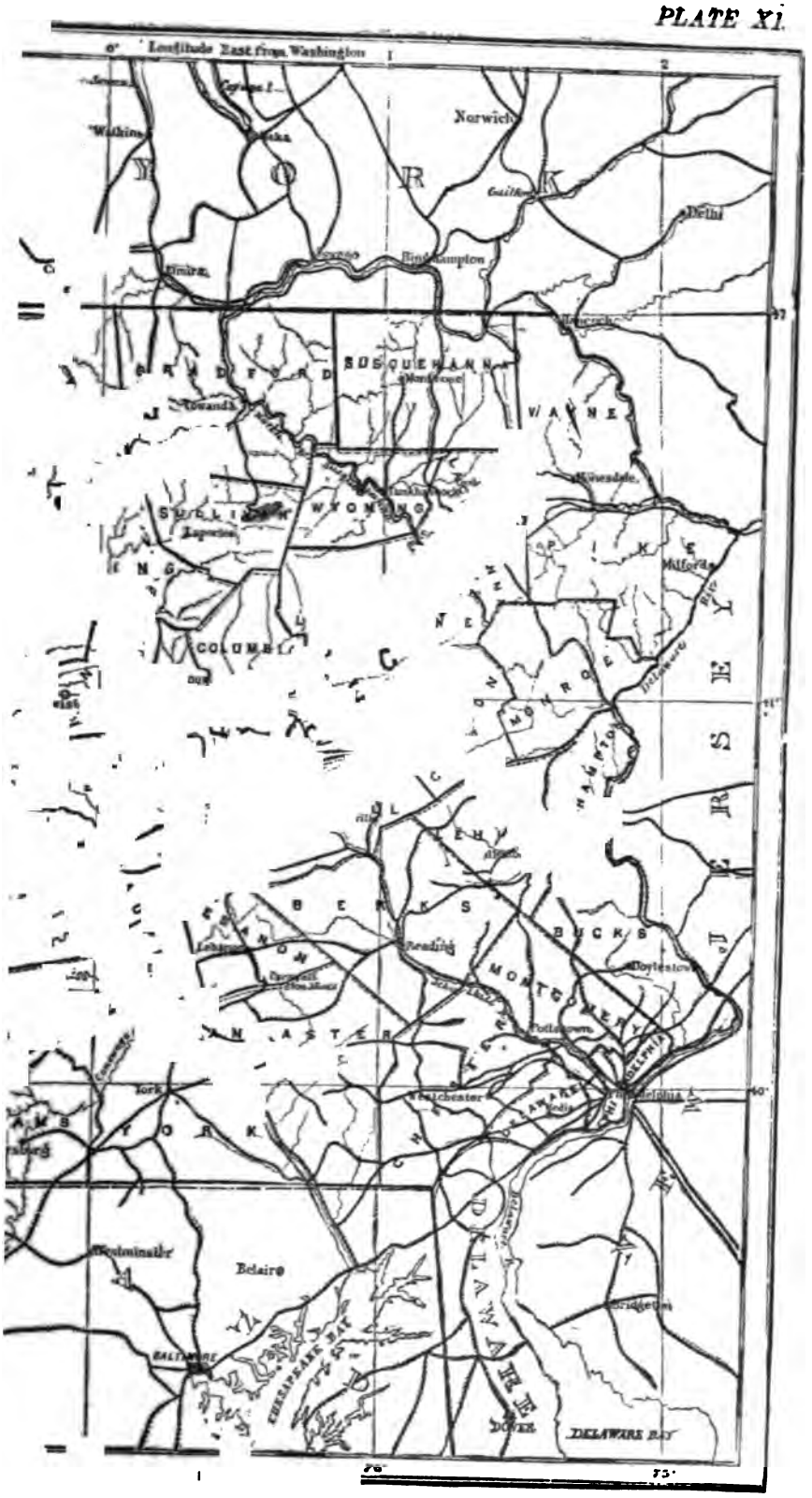


FIG. 11.—Rate of Increase of the Demand for Anthracite Coal in the United States.

Mr. Joseph S. Harris in the above diagram (Fig. 11) shows the rate of increase in demand since 1830, and the probable rate until 1930. Table II. shows the present number of collieries in the anthracite region.

Longitude West from Washington
LAKE ERIE
Dunkirk
Brocton
Mayville
Chautauqua Lake
Warren
Meadville
Clarion
Butler
Beaver
Indiana
Greensburg
Washington
Somerset
Bedford
Fayette
Waynesburg
Cumberland
BITUMINOUS COAL FIELDS
Coal Fields of Pennsylvania.

PLATE XI.


Longitude East from Washington
Norwich
Delhi
Binghampton
SUSQUEHANNA
WYOMING
WAYNE
Milford
Milesdale
COLUMBIA
MONROE
BERKS
BUCKS
Reading
Doylestown
MONTGOMERY
Philadelphia
Westchester
YORK
Baltimore
Belair
Bridgetown
DELAWARE
Dover
DELAWARE BAY
CHESAPEAKE BAY

Weight and Volume.—Analyses of various anthracite coals show the following results as regard weight and volume:

Name of Coal.	Cubic feet to 2000 lbs.	Cubic feet to 2240 lbs.
Honey Brook	34·5	38·6
Hazleton	34·8	38·9
Sugar Loaf	34·8	38·9
Old Company's	34·8	38·9
Spring Mountain	34·8	38·9
Greenwood	34·8	38·9
Cross Creek	35·1	39·2
Council Ridge	35·1	39·2
Buck Mountain	35·1	39.2
Locust Mountain	35·5	39·6
Mahanoy	35·5	39·6
Shamokin	36·9	41·0
Lorberry	37·3	41·4

TABLE II.—*List of Collieries in the Anthracite Coal-Regions of Pennsylvania April 1, 1882 [compiled by J. H. Jones, Statistician of the Combined Anthracite Coal Companies].*

*	Colliery.	Railroad.	Operator.
	SCHUYLKILL REGION: FIRST OR SOUTHERN COAL-FIELD.		
	LYKENS VALLEY DIST.		
6	Brookside	P. & R. R. R.	Phila. & R. C. & I. Co.
6	Kalmia	"	Phillips & Sheafer.
6	Lincoln	"	Levi Miller & Co.
6	Williamstown	N. Cent'l Ry.	Summit Br. R. R. Co.
6	Short Mountain	"	Lykens Val. Coal Co.
	LORBERRY DISTRICT.		
5	Colket	P. & R. R. R.	Phila. & R. C. & I. Co.
5	East Franklin	"	" " "
5	Middle Creek Shaft	"	" " "
5	Rausch Creek	"	Miller, Graeff & Co.
	WEST SCHUYLKILL DIST.		
3	Swatara	P. & R. R. R.	Phila. & R. C. & I. Co.
2	Otto	"	" " "
3	Phœnix Park No. 2	"	" " "
3	" " " 3	"	" " "
2	Forestville	"	" " "
2	Glendower	"	" " "
2	Richardson	"	" " "
2	Thomaston	"	" " "
2	Pine Knot	"	" " "
2	Mine Hill Gap	"	" " "
2	Wood	"	C. Wood.
2	Black Mine	"	J. D. Kurtz Crook.
2	Peach Mountain	"	Wm. H. Harris.
2	Black Heath	"	" "
3	Wolf Creek Big Diamond	"	J. F. Donahue.
3	Wolf Creek Diamond	"	Edwin Thomas.
2	Ellsworth	"	John R. Davis.
2	Black Valley	"	Edward Hoskins.
2	Dundas No. 7	"	Davis & Co.
2	Jugular	"	J. S. Hepner.
2	California	"	R. R. Reber.
	EAST SCHUYLKILL DIST.		
2	Beechwood	P. & R. R. R.	Phila. & R. C. & I. Co.
2	Wadesville Shaft	"	" " "
2	Pottsville	"	" " "
2	Pine Forest	"	" " "
1	Eagle Hill Shaft	"	" " "
2	Newkirk	"	" " "
2	Crystal	"	Joseph Brady.
1	Mammoth	"	Mahoney & Co.
1	Repplier	"	John F. Quinn & Co.
2	Bonanza	"	Thos. Ferrebee & Co.
1	Daniel Vein	"	Theo. Hellman.
2	Monitor	"	John Denning.
3	Peach Orchard	"	Samuel Brown.
1	Eagle	"	Geo. W. Johns & Bro.
2	St. Clair	"	Joseph Atkinson & Co.
2	Vipond	"	Thos. Burke.
2	Palmer Vein	"	Alliance Coal M. Co.
2	Kaska William	"	" " "
2	Pine Dale	"	Louis Lorenz.
2	Coal Hill	"	Holahan & Basler.
1	West Lehigh	"	Wood & Pearce.
1	East Lehigh	"	Mitchell & Simons.
1	West Summit	"	A. Raabe.
	PANTHER CREEK DIST.		
1	Colliery No. 3	L. & S. R. R. R.	Lehigh C. & N. Co.
1	" " 4	"	" " "
1	" " 5	"	" " "
1	" " 6	"	" " "
1	" " 8	"	" " "
1	" " 9	"	" " "
1	" " 10	"	" " "
1	" " 11	"	" " "
	SECOND OR MAHANOY COAL-FIELD.		
	SHAMOKIN DISTRICT.		
7	North Franklin No. 1, red-ash	P. & R. R. R.	Phila. & R. C. & I. Co.
7	North Franklin No. 2, white-ash	"	" " "
4	Bear Valley	"	" " "
4	Geo. Fales	"	" " "
4	Burnside	"	" " "
4	Cameron	N. Cent'l Ry.	Mineral R. R. & M. Co.
4	Luke Fidler	"	" " "
4	Hickory Swamp	"	" " "
4	Hickory Ridge	"	" " "
4	Pennsylvania	"	" " "
4	Lancaster	"	Smith & Kelser.
4	Royal Oak	"	Tillett & Brother.
4	Sterling	P. & R. R. R.	Kendrick & Co.
4	Henry Clay No. 1	"	J. Langdon & Co.
4	Carson	"	M. E. Robinson.
4	Peerless	"	Cruikshank & Emes.
4	Big Mountain	"	Patterson & Llewellyn.
4	Buck Ridge	"	May, Audenried & Co.
4	Greenback	"	H. J. Toudy.
4	Excelsior	P. & R. & N. C.	Excelsior Coal M. Co.
4	Enterprise	P. & R. R. R.	Enterprise Coal Co.
	WEST MAHANOY DIST.		
2	Mt. Carmel Shaft	P. & R. R. R.	Phila. & R. C. & I. Co.
2	Reliance	"	" " "
2	Helfenstein	P. & R. R. R.	Phila. & R. C. & I. Co
2	Locust Spring	"	" " "
2	Merriam	"	" " "
2	Potts	"	" " "
2	Keystone	"	" " "
1	Tunnel	"	" " "
1	Locust Run	"	" " "
1	East	"	" " "
1	North Ashland	"	" " "
2	Preston No. 2	"	" " "
1	" " 3	"	" " "
1	Girard	"	" " "
1	Hammond	"	" " "
1	Conner	"	" " "
2	Girard Mammoth	"	" " "
1	Turkey Run	"	" " "
1	West Shenandoah	"	" " "
1	Shenandoah City	"	" " "
1	Plank Ridge	"	" " "
1	Indian Ridge	"	" " "
1	Gilberton	"	" " "
1	Boston Run	"	" " "
1	Bear Run	"	" " "
2	Mt. Carmel	P. & R., N. C., & L. V.	Montellius & Co.
2	Black Diamond	L. V. & N. C.	Wm. A. Schwenk & Co.
2	Morris Ridge	L. V. R. R.	Isaac May & Co.
3	Ben Franklin	P. & R. R. R.	Douty & Baumgard-ner.
2	Franklin	"	S. S. Bickel.
2	Bell's Tunnel	L. V. R. R.	" "
2	Locust Gap	P. & R. R. R.	Græber and Shepp.
2	Monitor	"	Geo. W. Johns & Bro.
2	Big Mine Run	P. & R. and L. V.	Jeremiah Taylor & Co.
2	Hazel Dell	"	Sykes & Jones.
2	Logan	L. V. R. R.	L. A. Riley & Co.
1	Centralia	"	" " "
2	Continental	"	Lehigh Val. Coal Co.
1	Packer No. 1	P. & R. and L. V.	" " "
1	" " 2	L. V. R. R.	" " "
1	" " 3	"	" " "
1	" " 4	"	" " "
2	Monroe	"	Montana Coal Co.
2	Cuyler	P. & R. R. R.	S. M. Heaton & Co.
1	Wm. Penn	"	Wm. Penn Coal Co.
2	Oakdale	"	E. L. Powell.
1	Kohinoor	"	R. Heckscher & Co
1	Keeley Run	"	Thomas Coal Co.

* Refers to the character of the coal mined at the different collieries, por Index.

TABLE II.—(*continued*).

•	Colliery.	Railroad.	Operator.
2	Cambridge	"	Cambridge Coal Co.
1	East Bear Ridge	"	Myers, McCreary & Co.
1	West " "	"	" " "
1	Stanton	"	Miller, Hoch & Co.
1	Laurel Ridge	"	John A. Dutter.
1	Lawrence	"	Jacob S. Lawrence.
1	Draper	"	O. Ditson.
	EAST MAHANOY DIST.		
1	Ellangowan	P. & R. R. R.	Phila. & R. C. & I. Co.
1	Knickerbocker	"	" " "
1	St. Nicholas	"	" " "
1	Tunnel Ridge	"	" " "
1	Elmwood	"	" " "
1	Mahanoy City	"	" " "
1	North Mahanoy	"	" " "
1	Schuylkill	"	" " "
2	Coal Run	"	Suffolk Coal Co.
2	Webster	"	L. S. Baldwin. [Co.
2	North Star	"	Reynolds, Roberts &
2	Staffordshire	"	Jones, Ward & Co.
1	Glendon	L. V. R. R.	J. C. Hayden & Co.
1	Primrose	"	Primrose Coal Co.
1	Coplay	"	L. F. Lentz.
1	West Lehigh	"	Fisher Hazard.
1	Middle "	"	Mill Creek Coal Co.

LEHIGH REGION.

	GREEN MOUNTAIN BASIN.		
1	Upper Lehigh No. 2	L. & S. R. R.	Upper Lehigh Coal Co.
1	" " " 5	"	" " "
1	Pond Creek	"	Pond Creek Coal Co.
	BLACK CREEK BASIN.		
1	Sandy Run	L. & S. R. R.	M. S. Kemmerer & Co.
1	Cross Creek No. 1	L. V. & L. & S.	Coxe Bros. & Co.
1	" " " 2	"	" "
1	" " " 3	"	" "
1	Middle Cross Creek	S. H. & W. R. R.	" "
1	Lower " "	"	" "
1	West " "	"	" "
1	Highland No. 1	L. V. R. R.	G. B. Markle & Co.
1	" " 2	"	" "
1	Jeddo " 3	"	" "
1	" " 4	"	" "
1	Council Ridge No. 2	L. V. & L. & S.	J. Leisenring & Co.
1	" " " 5	L. & S. R. R.	" "
1	Ebervale No. 2	L. V. R. R.	Ebervale Coal Co.
1	" " 3	"	"
1	Black Ridge	"	Black Ridge Coal Co.
1	Harleigh	"	McNair & Co.
1	Latimer No. 1	"	Pardee, Bro. & Co.
1	" " 2	"	"
1	Milnesville No. 6	"	Stout Coal Co.
1	" " 7	"	" "
1	Hollywood	"	C. Pardee & Co.
	HAZLETON BASIN.		
1	East Sugar Loaf No. 1	L. V. R. R.	{Linderman, Skeer & Co.
1	" " " " 2	"	" " "
1	" " " " 3	"	" " "
1	" " " " 5	"	" " "
1	Humboldt	"	
1	Buck Mountain	"	Buck Mt. Coal Co.
1	South Sugar Loaf	"	A. Pardee & Co.
1	Laurel Hill	"	" "
1	Hazleton No. 1	"	" "
1	" " 3	"	" "
1	" " 6	"	" "
1	Sugar Loaf	"	" "
1	Cranberry	"	" "
1	Crystal Ridge	"	" "
1	Mt. Pleasant	"	Pardee, Sons & Co.
	BEAVER MEADOW BASIN.		
1	Beaver Meadow	L. V. R. R.	Coxe Bros. & Co.
1	Coleraine No. 1	"	W. T. Carter & Co.
1	" " 2	"	" " "
1	Spring Mountain No. 1	"	Lehigh Val. Coal Co.
1	" " " 4	"	" " "
1	" " " 5	"	" " "
1	Beaver Brook No. 1	"	Chas. M. Dodson & Co.
1	" " " 2	"	" " "
1	Spring Brook " 5	L. V. & L. & S.	Geo. H. Myers & Co.
1	" " " 6	L. V. R. R.	" " "
1	Honey Brook " 1	L. & S. R. R.	Leh. & Wilkesb. C. Co.
1	" " " 2	"	" " "
1	" " " 4	"	" " "
1	" " " 5	"	" " "

•	Colliery.	Railroad.	Operator.
	WYOMING REGION: NORTHERN COAL-FIELD.		
	PLYMOUTH DISTRICT.		
8	Salem	L. & B. R. R.	Salem Coal Co.
8	Colliery No. 3	"	Susquehanna Coal Co.
8	Avondale	"	D., L. & W. R. R. Co.
2	Boston	"	" " " "
8	Chauncey	"	T. P. McFarlane.
2	Gaylord	{D. & H. & L. & B.}	Gaylord Coal Co.
2	Dodson	L. & B. R. R.	Plymouth Coal Co.
2	Lance	"	Leh. & Wilkesb. C. Co.
8	Nottingham	"	" " "
8	Reynolds No. 16	"	" " "
2	Plymouth No. 2	{D. & H. & L. & S.}	Del. & Hud. Canal Co.
2	" " 3	{D. & H. & L. & B.}	" " "
8	" " 4	"	" " "
2	" " 5	"	" " "
2	Kingston No. 1	L. & B. R. R.	Kingston Coal Co.
2	" " 2	"	" "
2	East Boston	"	W. G. Payne & Co.
2	Black Diamond	"	Haddock & Steel.
2	Maltby	"	S. C. Maltby.
2	Mill Hollow	"	Waddell & Walters.
2	Ellenwold	"	Albright Coal Co.
2	Forty Fort	"	J. H. Swoyer.
	WILKESBARRE DISTRICT.		
2	Lehigh Luzerne No. 1	L. & B. R. R.	Leh. & Luzerne C. Co.
2	Colliery No. 1	L. & S. R. R.	Susquehanna Coal Co.
2	" " 2	"	" " "
2	" " 4	"	" " "
2	" " 5	"	" " "
2	Warrior Run	L. V. R. R.	A. J. Davis.
2	Franklin	"	Franklin Coal Co.
2	Hillman	"	H. Baker Hillman.
2	Enterprise	"	A. Langdon.
2	Henry	"	Lehigh Val. Coal Co.
2	Midvale	"	" " "
2	Mineral Spring	"	" " "
2	Oakwood Shaft	"	" " "
2	Prospect Shaft	"	" " "
2	Wyoming	"	J. H. Swoyer.
2	Bennett	L. & S. R. R.	Waldell & Co.
2	Mill Creek	"	Del. & Hud. Canal Co.
2	Pine Ridge	"	" " "
2	Laurel Run	"	" " "
2	Baltimore No. 1	"	" " "
2	" " 3	"	" " "
2	Conyngham	"	" " "
2	Hollenback	L. V. R. R.	R. S. Poole & Co.
8	Red Ash No. 1	L. & S. R. R.	Red Ash Coal Co.
8	" " 2	"	" "
2	Diamond No. 1	"	Leh. & Wilkesb. C. Co.
2	Hollenback No. 2	"	" " "
2	Empire No. 4	"	" " "
2	" " 5	"	" " "
2	Hartford No. 6	"	" " "
2	Stanton No. 7	"	" " "
2	New Jersey No. 8	"	" " "
2	Sugar Notch No. 9	"	" " "
2	" " 10	"	" " "
2	Wanamie No. 18	"	" " "
2	" " 19	"	" " "
	PITTSTON DISTRICT.		
2	Ontario	L. V. R. R.	Lehigh Val. Coal Co.
2	Exeter (W. Pittston)	"	" " "
2	Heidelberg Shaft	L. V. R. R.	Lehigh Val. Coal Co.
8	Everhart	{D. & H. & L. & S.}	Everhart Coal Co.
2	Tompkins Shaft	L. V. R. R.	G. R. Wilson & Co.
2	Eagle	"	Moser, Hoole & Co.
2	Seneca Shaft	"	Pittston Coal Co.
2	Ravine Shaft	"	" " "
2	Twin Shaft	"	" " "
2	Beaver	"	Waterman & Co.
2	Phœnix	L. & B. R. R.	Phœnix Coal Co.
2	Columbia	"	Grove Brothers.
2	Fairmount	{D. & H. & L. & S.}	A. Morris & Co.
2	Butler Shaft	"	Butler Colliery Co.
2	Hillside	L. V. & L. & S.	Hillside Coal & Ir. Co.
2	Central	Pa. Coal Co.	Pennsylvania Coal Co.
2	Barnum	"	" "
2	Stark	"	" "
2	Breaker No. 2	"	" "

TABLE II.—(*Continued*).

	Colliery.	Railroad.	Operator.
2	Breaker No. 6.	Pa. Coal Co.	Penna. Coal Co.
2	" " 8	"	" "
2	" " 10	"	" "
	SCRANTON DISTRICT.		
2	Anthracite	L. & B. R. R.	R. T. McCabe, receiver.
2	Greenwood No. 1	D. & H. & L. & S.	" " "
2	" " 2	L. & B. R. R.	" " "
2	Meadow Brook	"	W. Connell & Co.
2	National	"	" "
2	Park	D. & H. & L. & S.	Bridge Coal Co. (lim.).
2	Mt. Pleasant	D., L. & W. R. R.	W. T. Smith.
2	Green Ridge	D. & H. C. Co.	O. S. Johnson & Co.
2	Archbald Shaft	D., L. & W. R. R.	Del., Lack. & West. R. R.
2	Sloan "	"	" " "
2	Pyne "	L. & B. R. R.	" " "
2	Taylor "	"	" " "
2	Oxford "	"	" " "
2	Dodge "	"	" " "
2	Bellevue "	"	" " "
2	Hampton "	D., L. & W. R. R.	" " "
2	Continental "	"	" " "
2	Central "	"	" " "
2	Hyde Park "	"	" " "
2	Diamond "	"	" " "
2	Brisbin "	"	" " "
2	Cayuga "	"	" " "
2	Storrs "	"	" " "
2	Scranton Slope	L. & B. R. R.	" " "
2	Diamond "	D., L. & W. R. R.	" " "
2	Dunmore Breaker	Pa. Coal Co.	Pennsylvania Coal Co.
2	" Screens	"	" "
2	Gypsey Grove	"	" "
2	Leggitt's Creek Shaft	D. & H. C. Co.	Del. & Hud. Canal Co.
2	Marvine "	"	" "
2	Von Storch	"	" "
2	Capouse Shaft	D., L. & W. R. R.	Lack. Iron & Coal Co.
2	Pine Brook Shaft	"	" " "
2	Fairlawn	"	Fairlawn Coal Co. (limited).
2	Jermyn Shaft	D. & H. C. Co.	D. L. & W. and D. & H. Cos.
2	Stetler	L. & B. R. R.	D. N. Stetler.
2	Elk Hill	D. & H. C. Co.	Elk Hill Coal Co.
2	Pancoast	D., L. & W. R. R.	Pancoast Coal Co.
2	Lucas	D. & H. C. Co.	S. Lucas & Co.
	CARBONDALE DISTRICT.		
2	Eddy Creek	D. & H. C. Co.	Del. & Hud. Canal Co.
2	Grassy Island	"	" " "
2	White Oak	"	" " "
2	Jermyn Slope	"	" " "
2	" Shaft	"	" " "
2	Whitebridge Tunnel	"	" " "
2	Coal Brook	"	" " "
2	Racket Brook No. 1	"	" " "
2	" " " 8	"	" " "
2	Erie Shaft	"	Hillside Coal & Ir. Co.
2	Spring Brook	"	" " "
2	Forest City	N.Y., L. E. & W. R. R.	" " "
2	Throop Shaft	D., L. & W. R. R.	John Jermyn.
2	Filer No. 1	"	Filer & Livey.
2	" " 2	D. & H. C. Co.	" "
2	Eaton	"	Jones, Simpson & Co.
2	Winton	D., L. & W. R. R.	Pierce Coal Co. (lim.).
2	Chestnut Hill	"	E. E. Hendricks & Co.
2	Elk Creek	"	Thos. Brennan.
2	Nealon	"	Horan & Healey.

CHARACTER OF COAL MINED AT COLLIERIES.

1—Hard white-ash.
2—Free-burning white-ash.
3— kill red-ash.
4— kin.
5—Lorberry red-ash.
6— kens Valley red-ash.
7— vorton.
8— oming red-ash.

of —The graphitic an-
th ouse ch etts has already
about 400 square

miles. It is located in the central part of Rhode Island and the eastern part of Massachusetts, being found in a belt of transition rocks extending from Newport Neck, R. I., to Mansfield, Mass.; but its contents are so confused and broken that they can scarcely be assigned to a series of separate beds. In some places, as at Cumberland, R. I., deposits of coal as much as 23 feet in thickness are found, but these are of so limited extent as not to repay the cost of opening and operating a mine. The coal of this field was worked as early as 1808 at the Portsmouth mine, on the island of Rhode Island, and has been mined at intervals and in many localities since, but never with profit. The Rhode Island coal is described by Prof. Charles T. Jackson, State geologist, as of rhomboidal structure, due to imperfect crystallization by heat, its analysis giving from 77 to 84 per cent. of carbon, from 7 to 10 per cent. of water and volatile matter, and from 5 to 6 per cent. of ash. The same authority gives an analysis of coal from the Mansfield (Mass.) mine, showing 90 to 92 per cent. of carbon, 2 to 4 per cent. of water and volatile matter, and 4 per cent. of ash.

An analysis of Cranston (R. I.) coal, by Prof. Shaler, gives—

Volatile matter	3·55	Sulphur.....0·26
Fixed carbon	82·25	Sp. gravity...1·839
Ash	5·65	
Hygroscopic moisture	8·55	
	100·00	

According to Prof. Lesquereux, of the Second State Geological Survey of Pennsylvania, who is the highest authority on fossil flora, the coal-plants of this field correspond with those of the Salem and Mammoth anthracite and the lower Freeport bituminous beds of Pennsylvania.

VIRGINIA ANTHRACITE.—In the south-western portion of Virginia occur beds of coal proving by their analyses to be anthracite. These deposits are in the counties of Pulaski and Wythe, etc., along the southern border of Little Walker Mountain. The areas are limited. The coals have been greatly disturbed, and in many places are simply soft coal. This fact interferes with their value, so far as shipping to distant points is concerned, but they are exceedingly useful to supply the local demand for domestic uses, for railroads, and in the large zinc- and salt-works in the vicinity north of Martin's Station, in Pulaski county, and farther south-west. The following cross-section shows the presence of three distinct beds of coal, dipping about 20° south:

Regular stratified sandstone	30 feet.
Large bed—coal, 12 feet; slate, 4 feet	16 "
Top slate	2½ "
Hard coal	1½ "
Black, fine slate	7½ "
Coal-bed	3½ "
Bottom, hard black sandstone.	

The extent of the beds is not fully known, but they are found several miles to the north-east, and seem to occupy a long and narrow belt running from near the Potomac almost to Tennessee. They do not belong to the true Carboniferous coals, but to the upper Devonian (Rogers, No. X.) formation, and under the true coal-measures of Pennsylvania, Ohio, and North-west Virginia. Lesley speaks of this older coal-formation, "connected with the uppermost Devonian, White

Mountain sandstone, No. X., as occurring in Pennsylvania, near the head-waters of the Juniata," also "on the Potomac, below Cumberland," in the northern valley of Middle Virginia, and reaching its maximum development in Montgomery county, in Southern Virginia.

Analysis of Virginia Anthracite [made by Booth and Garrett of Philadelphia].

No.	Carbon.	Vol. matter.	Water.	Ash.	Color of Ash.
1.....	87·65	7·58	0·80	3·97	Buff.
2.....	86·35	7·27	0·80	5·58	"
3.....	89·47	6·00	0·40	4·13	Light brown.
4.....	89·02	6·42	0·50	4·06	Dirty white.
5.....	88·09	6·64	0.35	4.92	Brownish.
6.....	87·40	6·10	0·45	6·05	White.
7.....	85·85	6·20	0·60	7·35	

SEMI-ANTHRACITE COAL IN PENNSYLVANIA.—An important field of semi-anthracite coal occurs in Sullivan co., Pa. The Bernice coal-basin lies between Birch Creek on the north and Loyalsock Creek on the south. The basin is canoe-shaped, 6 miles long from east to west, but hardly one-third of a mile across. Coal B outcrops west of the line of the State Line and Sullivan Railroad. This bed "B" has about 8 feet of coal in a thickness of 12 feet. A cross-section of the bed, given in *Report "G G."* of the Second Geological Survey, is as follows:

Roof—sandstone, thin-bedded, micaceous.

Bed B	Coal	3'·0"
	Slate parting	3'· "
	Coal	1'·3"
	Slate, with coal intermixed	1'·6"
	Coal	4'·0"

The coal is bright, and is a true anthracite. Analyses of the whole bed and of each bench give—

	Water.	Vol. mat.	Mixed carbon.	Sulphur.	Ash.
Top bench	1·840	9·835	76·788	·647	10·890
Whole bed	1·295	8·100	83·344	1·031	6·230
Middle bench	1·800	9·650	82·373	·622	5·555
Lower bench	2·200	9·405	81·267	·618	6·490

By any system of classification the coal is an anthracite.

Leaving out the accidental impurities, and counting only the ignitable constituents of the fuel, we have—

Fixed carbon	91·142
Volatile matter	8·858
Proportion of vol. mat. to fixed carbon	1 : 10·289

This coal differs in appearance and structure from other Pennsylvania anthracites. It has a dull lustre, and entirely lacks the conchoidal fracture. It cannot be run through the ordinary anthracite breaker, as it would all be crushed. A special breaker is used, consisting of a plate with iron teeth; this descends and splits the coal, instead of crushing it. The Bernice mines ship from 40,000 to 50,000 tons annually.

The Progression from Anthracite to Bituminous.—In a direction across the basins northward from Bernice in Sullivan county to Gaines in Tioga and Potter counties, a distance of 50 miles, is seen the transition from anthracite to bituminous coal, the proportion of volatile matter to fixed carbon in the different basins being—

Gaines basin	1 : 1·9643
Blossburg basin	1 : 3·4939
Barclay "	1 : 4·0939
Bernice "	1 : 10·2893

The presence of an anthracite coal-bed and a semi-bituminous coal-bed in the same hillside, and only 60 feet apart, is sufficiently remarkable to call for special comment. This occurs in Sullivan county, at Bernice, and the semi-bituminous *underlies* the anthracite.

In another case in the same region a coal-bed has two benches, "the upper being semi-bituminous, the lower anthracite, with only 6 feet of slate between" (*Report Second Geol. Surv. of Penna.*).

COLORADO ANTHRACITE.—Anthracite coal of good quality has been found recently in Gunnison co., Col. Dr. A. C. Peale (in *Hayden's Survey Report for 1874*) describes locations in which anthracite or semi-anthracite coal was found from 2 to 5 feet in thickness. North of Gunnison City two beds of anthracite, from 5 to 7 feet thick, are found.

The anthracite coals of Colorado have recently attracted considerable attention; new discoveries and further developments are being made. The coals have been discovered in several different localities, all within the limits of Gunnison county, but no systematic geological exploration has been made to show the relative situation or the conformation and identification of the beds. The coal is not a true carboniferous anthracite, but is an "altered lignite," of the Post-Cretaceous formation, changed in composition by the action of heat, which has driven off the volatile matter and water, consequently increasing the relative proportion of fixed carbon. These coals vary much in composition in different beds, and even in the same bed in neighboring localities, occurring in all stages of transition from bituminous through semi-anthracite to hard anthracite rivalling in its purity the best anthracite of Pennsylvania. The following comparative analyses demonstrate this fact. This coal is found on Ohio Creek, a branch of the Gunnison River, north-west of Gunnison, also at Crested Butte, on Slate River, where the beds have been developed, and the coal proven to be of excellent quality (No. VI. analysis). The bed has about 5 feet of pure coal, lying slightly inclined in the mountain about 500 feet above the river. In the Ragged Mountains, on the recent Indian reservation, about 10 miles north-west of Irwin, very fine deposits of anthracite coal occur. The beds are from 7 to 11 feet in thickness, with 7 feet of pure coal. They are steeply inclined, outcropping on the edge of the mountains, so as to be definitely traced for at least two miles. On Coal Creek, a tributary to Anthracite Creek, and thence to the Gunnison River, good beds of semi-anthracite coal occur. The beds are 11 feet thick, with few slate partings, and being gently inclined, are suitable for economical working. This country, being but recently developed, has not yet reached the distinction of an anthracite-producing region, but will have it in the near future. The following analyses of these coals show them to be good anthracites:

	I.	II.	III.	IV.	V.	VI.
Water	2·00	1·60	4·00	7.40	3·68	1·640
Volatile matter	2·50	3·40	14·00			7·395
Fixed carbon	91·90	88·20	74·00	88·92	91·02	86·597
Ash	3·60	6·80	8·00	3·68	5·30	4·368
	100·00	100·00	100·00	100·00	100·00	100·000
Color of ash	Dark reddish brown.	Same.	Reddish.	Reddish.	Dark brown.	Red.

Nos. I. and II. are coal from Anthracite Creek; No. III. from Oh-be-Joyful Creek (these three from Hayden's *Report*); Nos. IV. and V. from Rock Creek; No. VI. from Crested Butte.

Comparative analyses of anthracite from Gilberton, Pa., and from the Gunnison county beds show—

	Gilberton.	Crested Butte, Gunnison co.
Moisture	2·980	1·640
Vol. matter	3·360	7·395
Fixed carbon	87·127	86·597
Ash	5·856	4·368

OTHER ANTHRACITE DEPOSITS.—There is a bed of anthracite near Santa Fé, New Mexico, described by Prof. R. W. Raymond, formerly of the U. S. Mining Commission, in his report for 1870, as a true anthracite, 4 to 5 feet thick, containing 80·5 per cent. of fixed carbon. In another place, 1½ miles distant from the first, Prof. Raymond found anthracite carrying 88 per cent. of carbon and 5 per cent. of ash of a brick-red color, the bed being 3½ feet thick.

Anthracite is known to exist at Skidegate Inlet, in Queen Charlotte's Islands, and on the mainland about 40 miles distant. These beds have not yet been explored, but the writer has seen specimens, said to have come from them, which were true anthracites of excellent quality.

The analyses in Table III. show the quality of the coals from the various deposits of anthracite, both foreign and domestic. Those of Wales and Ireland are not described in this article. The deposit in North Carolina is local, and can hardly be described as a field, its analysis, however, proving it to be anthracitic. The discoveries of Western anthracitic lignites are more recent, but the few localities mentioned show the limited area of anthracite in the world.

TABLE III.—*Analyses of Anthracite Coals.*

Location of coals.	Specific gravity.	Carbon.	Water and volatile matter.	Ash.
HARD WHITE ASH OF PENNA.				
Manch Chunk, Summit Mines	1·49	92.30	6·42	1·28
Nesquehoning, 10-ft. vein	1·55	86·60	6·40	7·00
Tamaqua, Skidmore Bed, East	1·57	92·07	5·03	2·90
Sugar Loaf Mountain	1·57	85·91	5·36	8·73
Beaver Meadow	1·63	85·34	9·60	5·06
Sharp Mountain	1·54	80·57	7·15	3·28
Gold-Mine Gap, first coal field	1·41	83·15	10·95	6·90
Raush Gap, " "	1·45	77·23	10·57	12·30
Shamokin	...	89·90	6·10	4·00
Wilkesbarre, Warden's Bed	1·40	88·90	7·68	3·49
Lackawanna	...	91·20	4·50	4·30
Pottsville, Delaware Company	1·46	86·09	6·96	6·95
" Nealey's Tunnel, Third Bed	1·55	89·20	5·40	5·40
RHODE ISLAND.				
Portsmouth Mines	1·85	85·34	10·50	3·66
MASSACHUSETTS.				
Mansfield Mine	1·69	87·40	6·20	6·40
NORTH CAROLINA.				
Near Leakesville, Middle Secondary rocks	...	88·12	7·76	9·12
SOUTH WALES.				
Neath Abbey	...	91·08	5.01	4·00
Swansea	...	89·00	7·50	3·50
Ystalyfera	...	92·46	6·04	1·50
Cwm Neath	...	93·12	5·22	1·50
Bonville Court Bed	...	94·18	4·84	·98
IRELAND.				
Rushes Bed	...	86·42	9·85	3·73
Sweet "	...	81·13	10·35	8·52
Pollough "	...	79·71	10·40	9·89

The pure anthracites of the same beds, considered separately from ashes and sulphur, give—

	Carbon, 96·53;	Hydrogen, 3·63;	Oxygen, 2·84
Sweet Bed	" 94·39;	" 4·05;	" 1·56
Pollough "	" 92·37;	" 2·40;	" 5·23

BITUMINOUS COAL.

BITUMINOUS COAL-MEASURES OF THE UNITED STATES.—The bituminous coal-fields of this country are subdivided into four, and sometimes five, separate fields, varying in extent. These fields include only the coal of true Carboniferous formation, and not the more recent coals of the Western States and Territories.

APPALACHIAN FIELD.—The most important field in regard to quantity, and the most valuable in regard to quality, is the Appalachian, which occupies an area of 59,105 square miles. Commencing with a series of small semi-detached basins in Pennsylvania, it extends in a general south-westerly direction, gradually narrowing in its course until it reaches Alabama, where it again widens at the extreme end of the basin. The peculiar basin structure of this field is best seen in its northern half. The upper measures, with the exception of a small portion in Alabama, are wholly wanting south of West Virginia. Nearly the whole of the region occupied by this field is an elevated plateau rising to a height of 2000 feet above the sea in Tennessee, its principal depression occurring along the Ohio River below Pittsburg. Its northern and western edges have suffered from denudation, and numerous isolated patches in Northern Pennsylvania, once connected, indicate an immense amount of loss. The absence of a similar raggedness on the eastern border is regarded as indicating the operation of different forces in that region. The field contains extensive changes of level, especially in the eastern portion, and, perhaps as a consequence of these undulations, there are vast areas of denudation in Virginia, Tennessee, Georgia, and Alabama.

The details of this field in each State are given in the separate descriptions following. The measures of the whole field are similar, being subdivided into the Upper coal-measures, Barren measures, and Lower coal-measures. The coal-beds are scattered through these measures, workable veins being found in each. Local developments are noticed in some of the beds, the thickness varying. The great Pittsburg is the largest and most valuable bed, and is continuous over a large area. (Plate XI.)

ILLINOIS BASIN.—The Illinois basin has an area of 47,188 square miles. It occupies the eastern portion of Illinois, extending into the western part of Indiana, and covering the north-west portion of Kentucky. Some authors think the beds of coal in this basin are equivalents of corresponding beds in the Appalachian field. It is claimed by some that the two fields were originally connected, and that the separation is due to erosion. The lower portion of the Carboniferous series is continuous from one basin to the other, but the coal-measures themselves are separated by a wide gap. Dr. Newberry shows that the Silurian rocks in Southern Ohio constituted a mountainous ridge long before the Carboniferous era, and says the coal could not have been united in Ohio. Lesquereux endeavors to show, by a comparison of plants, that the beds can be identified, but this theory is sometimes unappreciated by geologists. In this field the beds of coal are not as thick as in the Appalachian, but the number is about the same. The thickness of the measure is greatly reduced, while the limestones are more abundant. The coals are more apt to be impure, but there is an abundance of good workable beds.

THE MICHIGAN BASIN.—The Michigan coal-basin occupies an isolated tract covering an area of 6700 square miles, located in the centre of the southern portion of the State. There are 123 feet of measures, the coal being thicker in the centre of the field than on the edges.

THE MISSOURI BASIN.—The Missouri coal-basin, the largest in area in the United States, covers 90,343 square miles. Its development has not been carried as far, nor does it contain as many or as valuable seams of coal, as the Appalachian field. The coal, as a general rule, is not as pure, and is full of sulphur. The great advantage possessed by the field is the general distribution of its coal-beds over so large an area of country, much of which is destitute of any other fuel. The

field has its upper extension in Iowa, and from there covers portions of Nebraska, Iowa, Missouri, Kansas, Indian Territory, and Arkansas, with an extension into Texas. This latter is often classed as a separate basin.

In ARIZONA, near Camp Apache, a bed as mentioned belonging to the true Carboniferous coal.

Prof. Hitchcock tabulates the areas of the bituminous coal-fields of the United States for the census of

TABLE IV.—*Quantity of Coal produced in each State and Territory of the United States during the Calendar Years 1869, 1876, 1877, 1878, 1879, 1880, and 188* [weight expressed in tons of 2240 pounds]. (Bureau Statistics of U. S.)

STATE OR TERRITORY.	1869.	1876.	1877.	1878.	1879.	1880.	1888.
Anthracite.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Pennsylvania	13,866,180	21,436,667	23,619,911	20,605,262	26,142,689	26,437,242	39,216,818
Bituminous.							
Pennsylvania	7,798,517	11,500,000	12,500,000	13,500,000	14,500,000	19,000,000	30,175,828
Illinois	2,629,563	3,500,000	3,500,000	3,500,000	3,500,000	4,000,000	12,085,346
Ohio	2,527,285	3,500,000	5,250,000	5,000,000	5,000,000	7,000,000	9,741,916
Maryland	1,819,824	1,835,081	1,574,339	1,679,322	1,730,709	2,136,160	3,106,643
Missouri	621,930	900,000	900,000	900,000	900,000	1,500,000	3,491,042
West Virginia	608,878	800,000	1,000,000	1,000,000	1,250,000	1,400,000	4,909,663
Indiana	437,870	950,000	1,000,000	1,000,000	1,000,000	1,196,490	2,894,446
Iowa	263,487	1,500,000	1,500,000	1,500,000	1,600,000	1,600,000	4,442,821
Kentucky	150,582	650,000	850,0000	900,000	1,000,000	1,000,000	2,294,643
Tennessee	133,418	550,000	750,000	375,000	450,000	641,042	1,958,300
Virginia	61,803	90,000	90,000	75,000	90,000	100,000	958,036
Kansas	32,938	125,000	200,000	300,000	400,000	550,000	1,651,964
Oregon	.....	200,000	200,000	200,000	200,000	200,000	66,964
Michigan	21,150	30,000	30,000	30,000	35,000	35,000	72,328
California	.....	600,000	600,000	600,000	600,000	600,000	84,821
Rhode Island	14,000	14,000	14,000	14,000	15,000	15,000	3,600
Alabama	11,000	100,000	175,000	200,000	250,000	340,000	2,600,000
Nebraska	1,425	30,000	50,000	75,000	75,000	100,000	1,300
Wyoming	50,000	500,000	100,000	100,000	175,000	225,000	1,322,800
Washington	17,844	100,000	150,000	150,000	170,000	175,000	1,084,600
Utah	5,800	45,000	45,000	60,000	225,000	275,000	230,974
Colorado	4,500	250,000	300,000	367,000	400,000	575,000	1,951,318
Georgia	.....	.....	.....	.....	100,000	100,000	160,714
Total bituminous	17,211,814	27,569,081	30,688,339	31,525,322	36,665,709	42,763,692	
Total anthracite	13,866,180	21,436,667	23,619,911	20,605,262	26,142,689	26,437,242	1,634,811
Total anthracite and bituminous.	31,077,994	49,005,748	54,308,250	52,130,584	62,808,398	69,200,934	123,551,086

1888 as follows:

	Square miles.
Appalachian Basin:	
Pennsylvania	12,302
Maryland	550
Ohio	10,000
West Virginia and Virginia	16,000
Kentucky, Eastern	8,983
Tennessee	5,100
Georgia	170
Alabama	6,000—59,105
Michigan Basin:	6,700— 6,700
Illinois Basin:	
Illinois	36,800
Indiana	6,500
Kentucky, Western	3,888—47,188
Missouri Basin:	
Iowa	18,000
Nebraska	3,600
Missouri	23,100
Kansas	17,000
Arkansas	9,043
Indian Territory	13,600
Texas	6,000—90,343
Grand total	203,336

Report of Production of Coal in the United States for the Year ending June 1, 1888, by Coal-Fields.

Bituminous:	Tons of 2000 lbs.
Appalachian field	60,966,240
Western field (Illinois, Indiana, etc.)	11,842,764
Michigan field	81,407
Triassic field (Virginia and North Carolina)	33,000
Rocky Mountains, etc	4,583,719
Pacific Coast	1,385,750
Total bituminous	78,892,880
Anthracite	43,971,688
Grand total coal production of the United States for the year ending June 1, 1888	122,870,568
Grand total of hands employed in coal-mining	170,585

"The production of coal in England was, in 1855, 64,661,401 tons, and in 1877 it was 136,179,968 tons, and in 1888 it was 169,935,219 tons. The English ton, however, is 2240 lbs. The number of collieries in 1880 was, in England, 3890, and in the United States, 3264."

TABLE V.—*Bituminous Coal Statistics [from Report of Census of 1880].*

PRODUCTION OF BITUMINOUS COAL BY STATES EAST OF THE 100TH MERIDIAN.

Name of State.	Number of counties.	Number of establishments.	Total product census year, tons.	Value of total product at mines.	Value of material used in mines census year.	Wages paid to all classes of labor.	Total employés.	Number of steam-engines.	Horse-power of steam-engines.	Value of all machinery, including engines.	Value of plant.	Value of real estate.	Tons paying royalty (2000 lbs.).	Amount paid as royalty.	Acres coal-land worked out.	Acres coal-land unworked attached to working collieries.	Acres coal-land unspecified.	Grand total of capital, both establishments and irregular workings.
Total	314	2,943	40,940,028	$49,783,603	$4,661,862	$30,707,059	96,475	812	24,726	$2,403,211	$19,453,107	$62,354,034	13,689,864	$1,964,076	56,101	206,151	204,491	$93,517,464
Alabama	19	19	823,972	476,911	48,583	328,788	5,513	12	425	46,400	270,833	823,475	86,494	14,227	155	2,565	2,440	772,858
Arkansas	14	14	14,778	33,585	1,135	29,550	130	3	35	...	...	...	...	...	...	...	81	15,600
Georgia	1	2	154,644	251,605	9,500	85,179	442	...	...	...	311,000	100,000	15,000	1,875	62	16,028	...	441,745
Illinois	46	590	6,115,877	8,779,832	796,149	6,035,919	16,301	286	8,294	597,184	8,158,457	6,100,000	2,763,857	288,258	19,143	25,502	29,549	10,654,261
Indiana	19	216	1,454,327	2,150,258	168,604	1,405,164	4,496	65	1,717	146,908	1,146,859	773,445	899,856	197,311	2,884	8,000	2,407	2,304,720
Iowa	25	227	1,461,116	2,507,453	249,820	1,554,696	5,024	57	1,445	126,218	1,644,915	860,672	684,764	160,157	594	8,502	16,626	2,778,987
Kansas	24	189	771,142	1,516,544	47,485	738,980	3,617	4	230	...	...	...	...	...	...	...	1,600	767,994
Kentucky	49	65	946,588	1,134,960	95,995	687,474	2,826	18	522	51,150	782,252	939,385	213,490	29,017	1,285	30,748	8,887	1,968,537
Maryland	2	32	2,228,917	2,585,537	194,942	1,370,079	3,677	7	860	129,050	853,967	11,387,000	412,341	46,658	3,965	14,249	863	13,165,557
Michigan	2	6	100,900	224,500	7,750	146,000	412	6	285	...	...	...	...	...	...	...	107	66,800
Missouri	35	144	556,304	1,061,225	55,756	642,772	2,599	13	518	...	...	...	...	...	...	...	8,715	389,315
Nebraska	1	1	200	750	10	200	5	...	...	...	...	40,000	...	...	...	...	1	500
North Carolina	1	1	350	400	50	300	4	...	...	25	100	...	...	...	...	...	1,200	40,170
Ohio	30	618	6,008,595	7,719,767	931,298	5,100,547	16,831	131	3,835	386,904	3,258,581	8,529,991	2,630,108	458,468	9,984	33,988	24,651	13,652,484
Pennsylvania	29	666	18,425,163	18,567,129	1,754,602	10,863,583	33,248	170	5,391	720,189	7,242,624	27,152,403	5,099,817	728,735	57,497	60,814	57,497	33,709,344
Tennessee	9	20	495,131	629,724	47,323	336,765	1,092	6	132	10,750	415,371	1,222,847	141,818	35,390	...	...	23,743	1,708,968
Virginia	3	4	43,079	99,802	11,614	71,447	261	15	793	75,100	133,000	169,500	17,878	2,272	...	...	230	329,000
West Virginia	26	129	1,839,945	2,013,671	251,046	1,298,316	4,497	19	404	113,383	1,447,915	3,597,269	724,961	111,708	1,052	10,765	35,894	5,750,074

Production of Bituminous Coal during the Census Year ending June 1, 1880, compared with the one ending June 1, 1870, for Mines East of the 100th Meridian.

	Per cent.
1. Gain in number of mines	122·0
2. Gain in yearly tonnage	135·0
3. Gain in value of yearly product	44·0
4. Gain in value of material used	133·0
5. Gain in amount paid as wages	46·0
6. Gain in total number of employés	133·0
7. Gain in total capital	54·0
8. Decrease in value per ton	39·0
9. Gain in tons raised per man per year	3·0
10. Decrease in yearly earnings	36·0
11. Decrease in cost of labor per ton	38·0
12. Decrease in cost of material per ton	1·0
13. Gain in per cent. of value of the product paid for labor	0·7
14. Gain in per cent. of value of the product paid for materials	3·9
15. Decrease in per cent. of value of the product left for royalty, interest, profits, etc	4·6
16. Gain in number of counties reporting	68·0

TABLE VI.—*Number of Miles of Railroad in Operation in the United States during the Years 1865, 1870, 1875, 1877–1880.*

	1865.	1870.	1875.	1877.	1878.	1879.	1880.
New Engl'd States	3,834	4,494	5,638	5,814	5,873	5,903	5,997
Middle States	8,539	10,964	14,455	15,142	15,454	15,679	15,949
Southern States	9,129	11,163	13,287	13,812	14,079	14,333	14,908
Western States and Ters.	13,350	24,587	38,254	41,169	43,132	46,963	52,588
Pacific States and Ters.	233	1,679	2,462	3,152	3,298	3,619	4,229
Grand total	35,085	52,885	74,096	79,089	81,776	86,497	93,671

TABLE VII.—*Analyses of Anthracite and Bituminous Coals in all of the States of the United States.*

		Volatile Matter.	Fixed Carbon.	Ashes.	Moisture.	Sulphur.
Hard Anthracite Coal.						
Rhode Island	Rogers.	3·00	77·00	16·00	·91	0·62
Massachusetts	"	3·55	82·25	5·65		
Pennsylvania	"	4·54	89·20	6·26	1·20	0·33
Semi-Anthracite Coal.						
Pennsylvania	Rogers.	8·85	88·25	2·90		
Bituminous Coal.						
Pennsylvania	Rogers.	15·67	41·02	12·90	0·53	
Virginia	"	33·03	62·48	5·08		
Kentucky	"	40·92	53·11	6·10	...	0·66
Indiana	"	38·16	58·34	3·50		
Southern Illinois	"	42·05	50·52	7·40		
Middle Illinois	"	43·76	47·84	8·40		
Missouri	"	43·50	51·16	5·34		
Colorado	Macfarlane.	34·75	47·58	4·00		
Washington Territory	"	29·75	54·37	13·75		
Utah	" "	35·22	49·90	6·30		
Oregon	Raymond.	32·59	41·98	5·34		
California	"	40·20	49·70	3·09		
Wyoming	Macfarlane.	20·68	64·99	1·68		
New Mexico		13·06	74·37	6·05		
Alabama	E. A. Smith.	31·37	63·76	2·82		
Arkansas		10·80	83·48	3·51		
Arizona		30·55	52·50	16·40		
Iowa		39·24	45·42	6·77		
Michigan		49·00	45·00	2·00		
Maryland		17·53	76·16	6·81		
Wyoming and Montana		37·07	47·25	4·35		
North Carolina		16·74	49·74	33·91		
Ohio		56·02	93·52	8·62		
Tennessee		24·04	69·82	6·13		
West Virginia		36·98	54·64	7·29		
Western Kentucky		42·18	49·07	7·92		

PENNSYLVANIA BITUMINOUS COAL.—The great Appalachian coal-basin has its beginning in a series of small detached coal-fields in the northern central counties of Pennsylvania, and then extends south-west, through the State, into Ohio and Virginia. The area in Pennsylvania is extensive, spreading over portions of thirty-one counties, with a total area of coal-field, as given in the table, of 12,302 square miles. The

fields are generally classified by their geographical location. Beginning at the extreme north-east and going westward, they are the Blossburg, McIntyre, Towanda, Snowshoe, Clearfield, Johnstown, Broad Top, Salisbury, and the main field of Western Pennsylvania. (Plate XI.)

The *Blossburg* field is located in Tioga county, covering its lower portion, below Blossburg. There are five beds of coal in a thickness of 333 feet of strata. These beds are alphabetically designated as follows, and are given, with their thickness, the lowest being Coal A:

Coal A,	Bear Creek bed	3–3½ feet.
" B,	Bloss bed	4½–5½ "
" *b*,	Fire-clay bed	1½–3½ "
" C,	Slate bed	2 "
" *c*,	Monkey bed	3–3½ "
" D,	Seymour bed	3–4½ "
" E,	Rock bed	2½–3 "

These beds yield a semi-bituminous coal, which is also the character of the next two basins. Coal C is a sort of cannel coal, of an inferior grade in this location; farther west it improves. These beds show great uniformity in the different openings. They generally are level and easily worked, the roof being very good. Mines have been worked here since 1840. The best bed of coal is Bed B. The greatest dip of this bed is 10°; the floor is fire-clay. The production of this region in 1880 was 921,555 tons. These coals are in good demand, being excellent steam coals, and also good for smithing purposes.

The *McIntyre* district lies in the extreme north-eastern corner of Lycoming county. The coal-beds are located some 800 feet above the creek at Ralston, the central point of the region. The width of the basin is about six miles and the length about ten miles. The coal-beds are similar to those of the Blossburg region, three of them being of workable thickness. The mines are worked similarly to those of the Blossburg region, except that, owing to the height of the coal-beds above the surrounding country, long planes are necessary to lower the coal to the railroad.

The *Towanda* coal-basin, in Bradford county, has one seam of coal, found in the neighboring McIntyre basin and similarly situated, occupying the uppermost portions of the mountains.

The *Snowshoe* region, located in Centre county, west of Bellefonte, occupies a basin eight miles in length and four in width. There are five veins of coal, three of them being workable—viz., beds E, C, and A.

Coal E,	5 feet	good coal.
" D,	1 "	
" C,	6 "	with slaty partings.
" B,	4½ "	bony and slaty coal.
" A,	6–3½ feet	of good coal.

This coal is semi-bituminous in its character, and well adapted for steam and rolling-mill purposes.

The *Clearfield* region, situated on the Moshannon Creek, in Clearfield county, has lately become noted, and is one of the most productive of the small outlying coal-basins of the State. There are three workable seams of coal, 5 feet, 4½ feet, and 4 feet in thickness. The latter, Coal D, is principally worked. The beds, being level, are easily worked, have a good solid roof, drain themselves, and need no artificial ventilation. The coal is of exceptionally good character.

The *Johnstown* region, located in Cambria county, contains five beds of coal, shown in the following section in their descending order:

Measures	402½	feet.	
Coal E, coke-yard seam			3½ feet.
Slate	62	"	
Coal D, limestone seam			2½ "
Measures	51	"	
Coal C, cement coal			3½ "
Measures	106½	"	
Coal B, Peacock			3½ "
Measures	66	"	
Coal A, 4 feet, 3 feet, 1 foot slate	1	"	7 "
Conglomerate	—		—
	691		20

In this coal-region the coal is mostly used for home consumption in the large iron- and steel-works of the vicinity.

The *Broad Top* coal-basin is an independent coal-field, situated in Bedford, Huntingdon, and Fulton counties, 40 miles east of the Alleghany Mountains. The area is 81 square miles. There are five workable beds of coal, one, the principal producing bed, being from 5 to 10 feet thick.

The *Salisbury* basin, in Somerset county, is a short extension of the Cumberland coal-field of Maryland. It contains all the coals of the Lower measures and several square miles of the Pittsburg seam.

Main Field of Western Pennsylvania.—The remainder of the bituminous coal-fields of Pennsylvania is contained in the one large field in the south-western counties. The following description of its areas and beds is extracted from an article lately written by Dr. Chance of the State Geological Survey:

"The Upper Barren measures furnish but one seam of commercial importance, the Washington bed, which attains its best development in Washington and Fayette counties, but is not persistent as a workable seam in any other county. This series of rocks contains (see fig. 12) several other seams, but they are usually very thin and of poor quality, although one, the Waynesburg "A" bed, may prove workable over a small area in Fayette county.

"*Upper Productive Coal-Measures.*—The Waynesburg bed is a seam of great importance in Greene and Washington counties, attaining also a good thickness in Fayette and Westmoreland, holding the fifth place among the productive coal-seams.

"The Uniontown bed is locally workable in parts of Fayette and Greene counties. It is of little importance, as are the Sewickley bed and the Redstone bed; which latter is also locally workable in Westmoreland and Allegheny counties, with an average thickness of from 2 to 3 feet.

"The Pittsburg bed is the best and most valuable seam of the bituminous coal-area. It ranges from 6 to 12 feet in thickness, and, according to my estimates, contains nearly one-third of the available bituminous coal in Pennsylvania. Its most extensive areas are found in Fayette, Washington, Allegheny, Westmoreland, and Greene counties, small areas also occurring in Indiana, Somerset, and Beaver counties. The purity and quality of this coal, and the excellent character of coke made from it—the famous Connellsville—render it many times more valuable than any other seam. In parts of Washington county and in Greene county it lies deeply covered beneath a great thickness of overlying measures.

"*Lower Barren Measures.*—In Indiana, Somerset, and Butler counties this series contains several beds attaining workable size over limited areas, and in Armstrong and Beaver counties there is also a small quan-

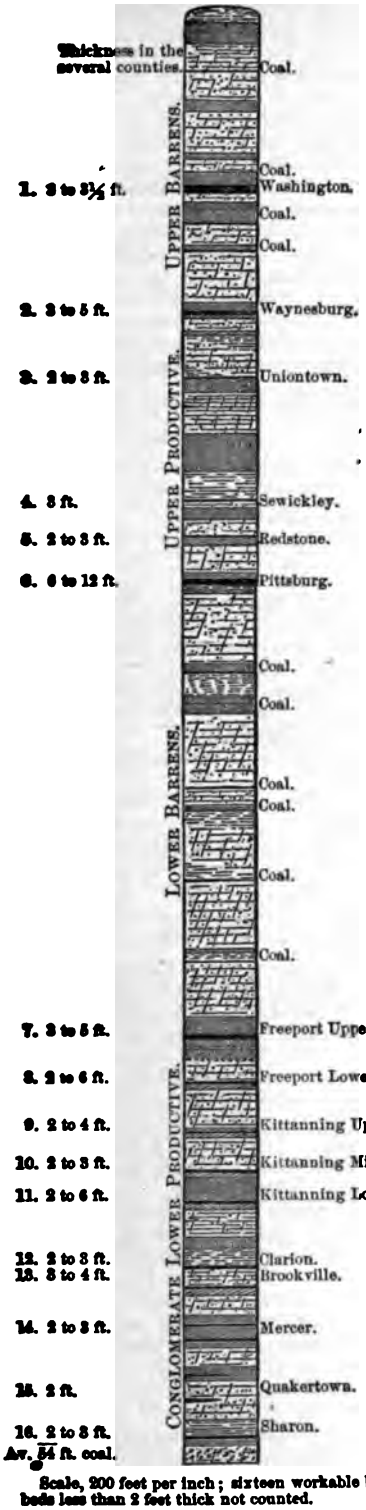


FIG. 12.—*Bituminous Coals of Pennsylvania* [from Second Geol. Survey, by H. M. Chance].

tity of minable coal in these measures. It will probably be worked, principally to supply the local demand.

"*Lower Productive Coal-Measures.*—In Fayette and Westmoreland counties the coals of this series contain a large amount of available coal; in Allegheny county the Freeport coals will furnish a large supply, but they are always of inferior quality.

"The Millerstown bed is locally workable in Butler county. It will be mined to meet the local demand.

"The Freeport Upper coal is workable in parts of fifteen counties. It furnishes some excellent coal, is often a superior coking coal, and in the western counties is always a strong steam, and often a good gas, coal. A small area of this seam in Clarion county is of a 'block' character, and the coal has been used raw in a small furnace (10′×33″) to smelt the limestone carbonate ores. This bed ranks third among the productive seams.

"The Freeport Lower coal is a bed of great importance in Jefferson, Indiana, Clearfield, Cambria, Armstrong, Centre, and Allegheny counties, and workable in parts of Beaver, Butler, Elk, Blair, Cameron, Westmoreland, and Fayette counties. It ranks fourth among the productive seams, and will furnish a large supply of good steam, coking, and gas coals, the character varying with the locality.

"Nearly all of the cannel coal in Pennsylvania occurs at the horizon of the Kittanning Upper coal. It is the celebrated 'Darlington' bed. The seam often consists partly of cannel and partly of bituminous coal, but is most frequently a bituminous seam of fair quality, attaining workable thickness in parts of Butler, Armstrong, Somerset, Beaver (cannel), Indiana, Jefferson, Elk, and Lycoming counties. It holds the seventh place among the productive seams.

"The Kittanning Middle coal becomes locally workable in Butler, Lawrence, Jefferson, Armstrong, Elk, Cameron, and Clarion counties. It will furnish, probably, one-half as much coal as the Kittanning Upper bed.

"The Kittanning Lower coal in twenty-two counties attains a workable thickness, and lies above water-level, favorably situated for mining. Along the Allegheny escarpment it is an excellent coking coal, and in the western counties often a good gas coal, and always a strong steam coal. In point of production it probably ranks second only to the Pittsburg bed; but the Freeport Upper coal may possibly equal, or slightly exceed, it in the amount of easily accessible coal. It averages from 2 to 4 feet in the western, and from 3 to 6 feet in the eastern, counties.

"The Clarion bed is formed in two subdivisions in some of the western counties, its upper split being known as the 'Scrub-grass' coal. Its output will probably be applied almost exclusively to satisfy the local demand. It sometimes furnishes coal of excellent quality, but the bed is usually quite thin.

"The Brookville bed is bed 'A' of the Allegheny escarpment counties. It will be about equally productive with the Kittanning Upper seam, but often furnishes a very sulphurous fuel.

"*Conglomerate Series.*—The Mercer Upper and Lower coals are workable over limited areas in Lawrence, Jefferson, McKean, Elk, Mercer, Venango, and perhaps in Forest county. Excepting in McKean, where their proximity to market enhances their value, and in Mercer county, where they attain their best development, they are of little importance. In Elk and Jefferson they will yield a considerable tonnage.

but in the latter county at least this will be applied almost exclusively to meet the local demand.

"The Quakertown coal is workable over a small area in Mercer county.

"The Sharon coal in Mercer county is a bed of great value, but its available area will be exhausted in the near future. This horizon will furnish a small amount of coal in Crawford and Warren counties, but in the latter county it is thin and of inferior quality.

"The area actually covered by the bituminous coal-measures in Pennsylvania is about 9000 square miles. The Upper Productive series extends over but a small fractional portion of this area; the Barren measures extend over a considerable area, hiding beneath a thick covering large areas of the coals of the Lower Productive measures, otherwise easily accessible."

TABLE VIII.—*Bituminous Coal in Pennsylvania by Counties.*
[From Second Geological Survey, by H. M. Chance.]

County.	Area in Acres.	Tonnage.	County.	Area in Acres.	Tonnage.
Allegheny	224,000	2,496,000,000	Greene	336,000	2,664,000,000
Armstrong	377,600	1,872,000,000	Indiana	446,000	2,184,000,000
Beaver	186,400	652,800,000	Jefferson	416,000	1,992,000,000
Blair	17,600	92,400,000	Lawrence	105,600	398,400,000
Bradford	10,880	46,100,000	Lycoming	9,600	52,800,000
Butler	368,000	1,704,000,000	Mercer	131,200	492,000,000
Cambria	364,800	1,756,800,000	McKean	12,800	43,200,000
Cameron	38,800	129,600,000	Potter	6,400	24,000,000
Centre	150,800	748,800,000	Somerset	297,800	1,170,000,000
Clarion	172,800	688,800,000	Sullivan	2,560	11,500,000
Clearfield	240,266	1,410,400,000	Tioga	16,000	129,600,000
Clinton	16,000	62,400,000	Venango	16,000	52,800,000
Crawford	3,200	14,400,000	Washington	698,000	4,128,000,000
Elk	228,200	913,800,000	Warren	3,200	9,600,000
Forest	1,280[1]	3,800,000	Westmoreland	278,400	2,428,800,000
Fayette	470,400	4,574,400,000	Area in acres	5,600,786	
			Total		33,547,200,000

The amount of coal excluded from these estimates on account of poor quality, depth beneath water-level, or beneath a thick covering of overlying rocks, is very great. As the estimates prove the existence of an amount of easily accessible coal of good quality sufficient to supply the demand for several centuries, estimates of the tonnage of the impure seams or inaccessible areas would be of no practical value to the present generation.

[1] Area in square miles, 8·751.

TABLE IX.—*Analyses of Pennsylvania Bituminous Coals (from Second Geological Survey of Pennsylvania).*

Counties.	Samples.	Water.	Volatile Matter.	Fixed Carbon.	Sulphur.	Ash.
Greene	17	1·14	35·736	51·755	1·795	9·105
Washington	21	1·16	37·107	50·993	2·064	8·719
"	9	1·19	36·791	56·527	0·850	4·637
Beaver	20	1·96	39·041	50·202	1·996	6·959
Lawrence	14	2·11	40·450	52·514	1·373	3·255
Butler	11	1·91	39·883	48·967	1·968	7·222
Indiana	29	0·98	29·259	58·738	1·734	9·459
Westmoreland	27	1·14	32·273	59·227	1·500	5·971
Fayette	12	0·95	29·753	60·471	1·787	7·040
Somerset	30	1·15	19·774	67·780	1·615	9·669
Cambria	25	0·95	21·599	67·325	1·625	8·176
Blair	9	1·06	27·271	60·690	2·314	8·662
Huntingdon	8	0·47	16·539	72·846	1·978	8·160
McKean	11	2·25	34·493	46·251	2·973	14·024
Potter	3	1·72	32·285	55·315	1·011	9·675
Tioga	17	1·65	20·505	67·791	1·257	8·852
Bradford	7	0·82	16·946	69·264	0·672	12·291
Lycoming	2	1·06	17·530	72·416	0·838	8·155
Sullivan	12	3·24	13·031	72·740	0·611	10·380

FIG. 13.—Map of Maryland Coal-fields.

BITUMINOUS COALS IN MARYLAND.—The *Cumberland coal-field* in Allegheny county, Md., is 30 miles long, and has an average breadth of 4½ miles. Its northern end reaches into Pennsylvania, and its southern extremity into West Virginia. The main bed of coal, called the "Big seam," is 12 feet thick in the centre of the field, 14 feet in many places, and quite regular. It produces from 5000 to 6000 tons of coal per acre. The maximum thickness of Carboniferous strata is about 1200 feet, and there are thirty beds of coal, aggregating 70 feet in thickness, but most of them are too thin to mine. The product of this region is well known in the market, as it has been mined since 1842. In 1880 there were twenty mining companies operating here, and their aggregate output was 2,136,160 tons. Besides the Big seam, there are other beds of coal, as shown in the accompanying cross-section, by Philip T. Tyson:

TABLE X.—*Cross-section by Prof. Philip T. Tyson.*

Feet above tide.	No.		
	28	Shale	14
	27	Coal I	2
50	26	Shaly sandstone	190
	25	Shale	22
	24	Coal K, Waynesburg	6
	23	Limestone and shale	120
	22	Fire-clay	13
	21	Unknown	2
	20	Iron in shale	2
	19	Shale	27
1950	18	Fine-grain sandstone	3
	17	Shale	2
	16	Coal, 2 in. slate, J	4
	15	Fire-clay	10
		Coal J, Sewickley	3
1900	14	Fire-clay	3
	13	Shaly sandstone	81
	12	Micaceous "	
	11	Coarse "	
	10	Shale	42
	9	Coal J, redstone	4
	8	Shale	2
1800	7	Coal	1
	6	Shale	4
	5	Coal	
	4	Shale	1
	3	Shaly sandstone	1
	2	Shale, ferruginous	4
	1	Main coal H, Pittsburg	14

The lower seams are 4 feet 6 inches, 3 feet 6 inches, 6 feet, and 2 feet, in a thickness of 250 feet. The lowest seam is the Bluebough coal, which is in two branches, respectively 32 inches and 8 inches thick, separated by 12 to 16 inches of shale. The next seam is the Parker coal, 2 to 2½ feet thick and 36 feet higher. The Powell seam is 30 feet higher, and said to be 3½ feet thick. The Percy seam, 20 feet higher, contains 30 inches of coal. The fifth bed, the Hall, is 30 feet higher and 4 feet thick. A sixth bed, the Rush Run coal, 2 feet thick, is still higher. Cross-sections show that the whole system of coal-measures is represented, up to the highest valuable coal-seam, but without the overlying second series of Barren measures found near the Ohio. The coal-beds of the Upper coal-measures are here in their greatest magnitude; the seams found in the Barren measures are also enlarged; and those of the Lower coal-measures are small, being split up into a large number of thin seams.

Cumberland coal is a true semi-bituminous. The coal is all taken from the mine, fine and coarse, and is not separated. It is jet black and has a glossy appearance; it is friable, and becomes pulverized in course of transportation and handling. The distance from tide-water to Cumberland is 178 miles, and to Piedmont 206 miles. By the Chesapeake and Ohio Canal the distance is 191 miles.

TABLE XI.—*Analyses by Prof. W. B. Rogers.*

	Carbon.	Water and vol. mat.	Ash.
g.....	78·40	19·72	7·88
oot seam).....	79·08	16·28	6·64
d's (Abraham's Creek, 3d seam).	74·00	18·60	7·40
er (Hardy co., lower seam).....	79·16	15·52	5·32

LS OF VIRGINIA.—There are several detached lds in the Mesozoic rocks of Virginia east of leghany Mountains. The latest and best ac- of them is contained in a paper published in y Oswald J. Heinrich, E. M., from which the ng abstract is made: The Richmond deposit, or ond coal-basin, generally known as the Rich- coal-field, is by far the most important of these It extends from the northern county-lines and Henrico counties, across the James

TABLE XII.—*Shipments of Coal from the Cumberland Region of Maryland from* 1874 *to* 1889.

	Long tons.
1874	2,254,199
1875	2,188,436
1876	1,718,853
1877	1,574,339
1878	1,688,324
1879	1,730,658
1880	2,069,587
1881	1,960,016
1882	1,272,122
1883	1,891,495
1884	2,453,810
1885	2,386,887
1886	2,152,713
1887	2,811,883
1888	2,934,907
1889	2,510,478

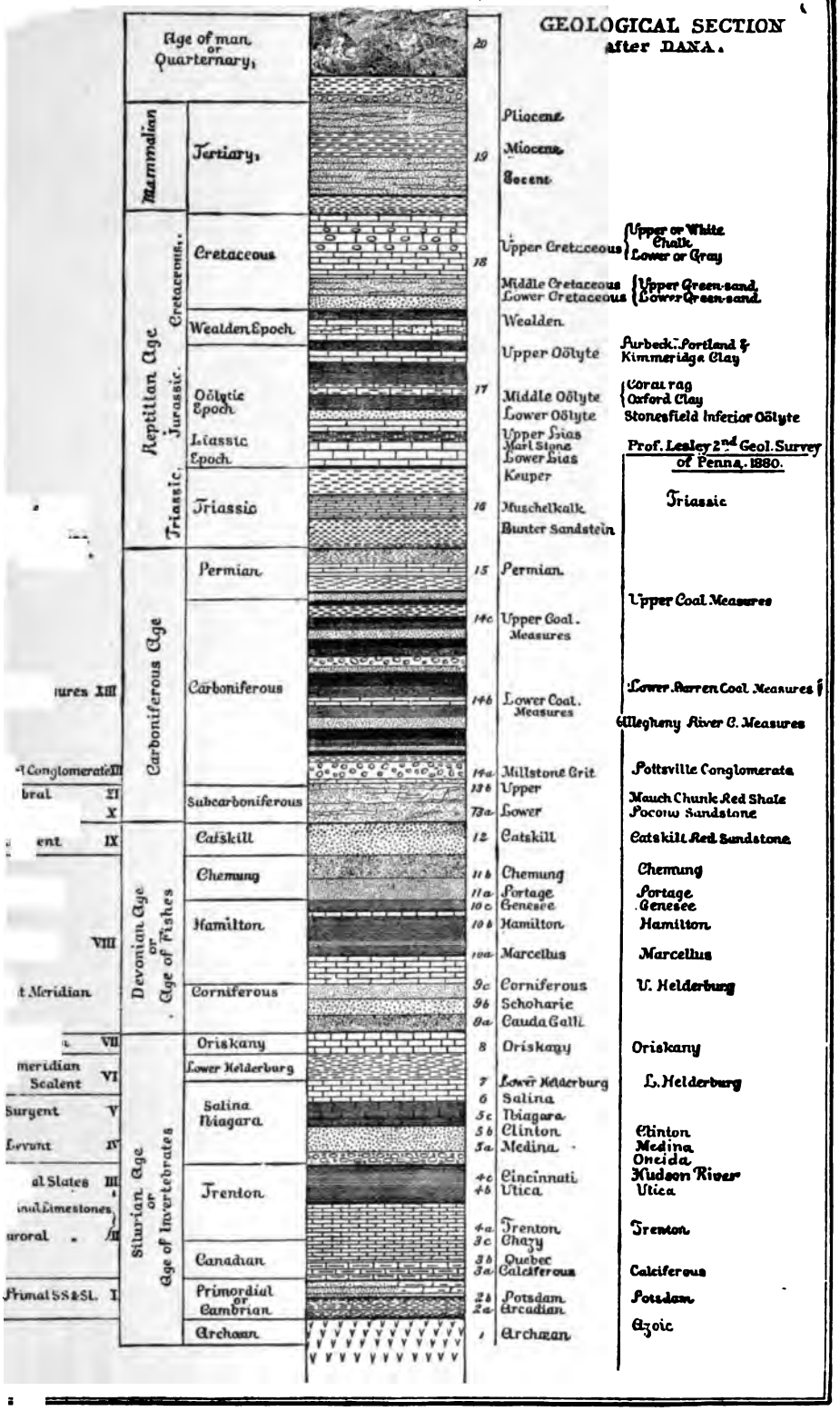
'AB XIII.—*Annual Production and Shipments of Coal from the Richmond Coal Basin, in Tons of 2000 Pounds.*

By R. F. & P. R. R.	By J. R. & K. Canal.	By R. & D. R. R.	By C. H. R. & P. R. R.	By wagons.	Consumed at the mines; est'd.	Total shipped.	Total produced	General Remarks.
...	...	...	...	...	...	1,925,000	1,925,000·00	Total amount, according to R. C. Taylor's and other reports.
18,000 est.	...	...	14,300 est.	57,051	6,254·57	89.351	95,605·57	Previous to 1841 Deep Run produced about 18,000 tons, taken as average until 1847, when the mines stopped.
18,000 "	18,418	...	14,300 "	57,051	7,543·83	107,769	115,312·83	Ch. C. & I. M. Co. raised 213,508 tons from 1841 to 1851, or 21,351 tons on an average.
18,000 "	36,446	...	14,300 "	57,051	8,805·79	125,797	134,602·79	Midlothian Co., est. 35,700 tons on an average from 1843 to 1852; books burned at the evacuation of Richmond.
18,000 "	23,462	...	18,000 "	57,051	8,155·91	116,513	124,668·91	Transportation on old Richmond horse railroad up to 1851 from Midlothian district.
18,000 "	27,446	...	25,000 "	57,051	8,924·79	127,497	136,421·79	Clover Hill R. R. books burned at the evacuation of Richmond; amount est. from 1843 to 1852 by the treasurer of the company.
...	30,797	...	25,000 "	57,051	7,899·36	112,848	120,747·36	
...	37,997	...	30,000 "	57,051	8,753·36	125,048	133,801·36	
...	35,937	...	36,000 "	57,051	9,029·16	128,988	138,017·16	
...	27,531	17,432·40	43,000 "	39,619	8,940·74	127,582·40	136,523·14	
...	21,752	34,955·25	43,000 "	...	6,979·49	99,707·25	106,686·74	
...	21,098	15,620·69	58,352	...	6,654·97	95,070,69	101,725·66	
...	20,533	43,454·00	59,895·36	...	8,671·74	123,882·36	132,554·10	
...	21,152	35,621·95	60,961·60	...	8,241·45	117,735·55	125,977·00	
...	19,084	38,842	41,279·84	...	6,944·42	99,205·84	106,150·26	
4,000 est.	28,824	24,274	50,216·32	...	7,511·98	107,314·32	114,826·30	
4,000 "	17,477	29,918	54,904·64	...	7,434·70	106,299·64	113,734·34	
4,000 "	14,156	30,834	50,391·04	...	6,956·67	99,381·04	106,337·71	
3,495 "	21,305	32,315	47,999·84	...	7,358·04	105,114·84	112,472·88	
500	20,146	18,353	49,502·88	...	6,195·13	88,501·88	94,697·01	
...	20,612	29,146	56,680·96	1,500 est.	7,555·73	107,938·96	115,494·69	Miscellaneous transportation, estimated by hauling in wagons during the war.
...	19,608	42,000 est.	41,628·16	1,500 "	7,331·52	104,736·16	112,067·68	R. & D. R. R., no reports kept in consequence of depreciation of currency during the war.
...	20,000 est.	42,190	40,751·20	1,500 "	7,300·87	104,441·20	111,742·07	J. R. & K. Canal, estimated; books being burned with the office at the evacuation of Richmond.
...	20,000 "	42,000 est.	5,312·72	1,500 "	4,916·89	68,812·72	73,729·61	R. & D. R. R., the same reason as in 1863.
...	19,842	25,918	20,512·80	...	4,639·09	66,272·80	70,911·89	R. F. & P. R. R., no coal shipped during the war, the Deep Run mines belonging to a Northern company.
6,289·2	41,150	19,700·1	18,384·24	...	5,286·65	85,523·54	90,810·19	
2,606·5	45,280	14,782	27,223·84	...	6,292·39	89,891·34	96,183·73	
9,179·07	38,682	20,433	39,709·21	...	7,560·23	108,003·28	115,563·51	
2,904·08	31,100	26,734	23,560·16	...	5,900·87	84,298·19	90,199·06	
2,078	11,860	34,288	47,037·20	...	6,668·42	95,263·20	101,931·62	
57	13,167	29,175	47,295·36	...	6,278·60	89,694·36	95,972·96	
3,027	13,792	38,025	40,019·84	...	6,640·47	94,863·84	101,504·31	
824	20,440	18,690·21	36,542·24	...	5,354·75	76,496·45	81,851·20	
5,404	19,301	14,453·08	43,744·96	...	5,803·21	82,903·04	88,706·25	
...	8,682	16,321·64	28·366·00	...	3,812·00	53,369·64	57,181·64	
...	6,841	14,741·49	34·197·00	...	12,127·80	55,779·49	67,907·29	
38,362·80	793,918	750,217·81	1,287,369·41	502,027	250,725·59	5,396,895·02	5,647,620·61	

River to the Appomattox River, lying in Powhatan, but mainly in Chesterfield county. About 11 miles west of Richmond it extends upon both sides of the James, but mainly upon the south. Its shape somewhat resembles the contour of a plum, with its peduncle pointing north, formed by a narrow branch extending northward from Tuckahoe Creek for about 6 miles, averaging about 1 mile in width. Including the northern spur, the length of this basin is about 31½ miles, over 24 miles of it in the main body. The width varies from 7½ to 10 miles, comprising in all an area of about 189 square miles. At least two workable beds of coal are known to exist in this basin. The lower is 566 feet from the granite floor, and is from 3 to 5 feet thick, and the upper, or Big bed, is from 20 to 40 feet thick. The distance between the two beds is about 50 feet. A third bed, 1 foot thick, lies about midway between them. The Big bed is frequently split into two divisions, with

TABLE XIV.—*Analyses of Coal from the Richmond Basin.*

Name of Pit.	By whom Analysed.	Moisture.	Volatile Matter.	Fixed Carbon.	Ash.	Sulphur.	Coke.
SOUTH OF JAMES RIVER.							
EASTERN OUTCROP.							
Clover Hill (Coxe's Mines)	Prof. Johnson	1·339	30·984	56·831	10·132	·514	66·963
" " " "	W. B. Rogers	—	29·12	65·52	5·36	—	70·88
" " " "	G. W. Andrews	—	38·50	55·00	6·50	—	61·50
Stone Henge	W. B. Rogers	—	36·50	58·70	4·80	—	63·50
Creek Company Shaft	Prof. Johnson	1·450	26·788	60·30	8·57	2·89	68·672
Chesterf'ld C. & I. M. C. Midlothian Colliery. Mills & Reed, Creek Shaft	W. B. Rogers	—	38·60	57·80	3·60	—	61·40
Greenhole Shaft	" "	—	31·17	67·83	2·00	—	69·83
Midlothian, average	Prof. Johnson	2·455	29·738	53·012	14·737	·058	67·749
" " new shaft	" "	0·670	31·208	56·40	9·44	2·286	65·840
" " screened	" "	1·785	34·295	54·063	9·655	·202	63·718
" " 900-ft. shaft	" "	1·172	27·278	61·083	10·467	—	71·550
" "	B. Silliman and O. P. Hubbard	2·000	31·62	58·26	7·67	—	66·310
" "	J. H. Alexander	—	31·60	61·10	7·10	—	68·20
" " Grove Shaft, 1875, screened	A. S. McCreath	1·03	38·23	54·27	6·47	1·52	60·74
Midlothian, average	" "	1·05	36·49	46·702	15·758	2·23	62·468
Maidenhead	W. B. Rogers	—	32·83	63·97	3·20	—	67·17
English Co., old shaft	" "	—	35·82	53·36	10·82	—	64·18
" " middle bench	" "	—	28·40	66·50	5·10	—	71·60
" " top bench	" "	—	28·80	61·68	9·52	—	71·20
Chesterfield Mining Co	Prof. Johnson	1·896	28·719	58·794	8·634	1·957	67·428
Willis's Pit (Ætna Shaft)	Clemson	—	28·80	66·60	4·60	—	71·20
WESTERN OUTCROP.							
Powhatan Pits	W. B. Rogers	—	32·33	59·87	7·80	—	67·67
Scott's Pit	" "	—	33·70	60·86	5·66	—	66·52
NORTH SIDE OF JAMES RIVER.							
EASTERN OUTCROP.							
Carbon Hill, bit. upper seam	O. J. Heinrich	1·40	20·60	60·80	17·20	Not determ'd.	78·00
" " second seam	" "	0·40	18·60	71·00	10·00	—	81·00
" " carbonite	" "	1·57	9·64	79·93	8·86	Considerable.	88·79
" " average	Prof. Johnson	1·785	23·959	59·976	14·28	—	74·256
" " natural coke	" "	1·116	11·977	75·081	11·826	—	86·907
" " carbonite	Dr. W. Wallace, of Glasgow	1·56	14·26	81·61	02·24	0·33	83·85
WESTERN OUTCROP.							
Anderson's Pits (Dover)	W. B. Rogers	—	28·30	66·78	4·92	—	71·70
" " "	Clemson	—	26·00	64·20	9·80	—	74·00
T. M. Randolph	W. B. Rogers	—	30·50	66·15	3·35	—	69·50
Coalbrookdale	" "	—	29·00	66·48	4·52	—	71·00
" 1st seam	" "	—	24·00	70·80	5·20	—	76·00
" 2d seam	" "	—	22·83	54·97	22·20	—	77·17
" 3d seam	" "	—	24·70	65·50	9·80	—	75·30
" 4th seam	" "	...	21·33	56·07	22·60	—	78·67
Cranches, upper seam	" "	...	30·00	64·60	5·40	—	70·00
Waterloo	" "	...	26·80	55·20	18·00	—	73·20
Deep Run Basin	" "	...	26·16	69·86	5·00	—	74·86
FOR COMPARISON.							
Westmoreland, Pa., Gas Coal	Booth & Garrett	1·30	31·45	61·45	5·80	1·04	67·25
Campbell's Creek, W. Va., splint.	Riverside Iron Co	1·88	35·64	61·07	1·41	—	62·48
" " 2d seam	W. B. Rogers	—	32·24	64·16	3·60	...	67·76
" " 3d seam	" "	—	33·68	57·76	8·56	...	66·32
Cannelton, Gas Coal	Ford	—	35·10	62·90	2·00	...	64·90
Raymond City	Vinton	—	33·00	60·10	6·90	...	67·00
Lingan, Cape Breton	Chandler	—	35·20	60·80	4·00	...	64·80
Newcastle, England	"	...	32·70	65·55	1·75	...	67·30
" "	McCreath	0·69	30·29	64·69	2·81	1·52	67·50


GEOLOGICAL SECTION
after DANA.
Age of man or Quarternary
Mammalian
Tertiary
Pliocene
Miocene
Eocene
Reptilian Age
Cretaceous
Upper Cretaceous
Upper or White Chalk
Lower or Gray
Middle Cretaceous
Lower Cretaceous
Upper Green-sand
Lower Green-sand
Wealden Epoch
Wealden
Jurassic
Oölytic Epoch
Upper Oölyte
Purbeck, Portland & Kimmeridge Clay
Middle Oölyte
Coral rag
Oxford Clay
Lower Oölyte
Stonesfield Inferior Oölyte
Liassic Epoch
Upper Lias Marl Stone
Lower Lias
Prof. Lesley 2nd Geol. Survey of Penna. 1880.
Keuper
Triassic
Triassic
Muschelkalk
Bunter Sandstein
Carboniferous Age
Permian
Permian
Upper Coal Measures
Upper Coal. Measures
Carboniferous
Lower Coal. Measures
Lower Barren Coal Measures
Allegheny River C. Measures
Millstone Grit
Pottsville Conglomerate
Subcarboniferous
Upper
Lower
Mauch Chunk Red Shale
Pocono Sandstone
Devonian Age or Age of Fishes
Catskill
Catskill
Catskill Red Sandstone
Chemung
Chemung
Portage
Genesee
Hamilton
Hamilton
Marcellus
Corniferous
Corniferous
U. Helderburg
Schoharie
Cauda Galli
Silurian Age or Age of Invertebrates
Oriskany
Oriskany
Oriskany
Lower Helderburg
L. Helderburg
Salina
Niagara
Salina
Niagara
Clinton
Medina
Oneida
Hudson River
Cincinnati
Utica
Utica
Trenton
Trenton
Chazy
Canadian
Quebec
Calciferous
Calciferous
Primordial or Cambrian
Potsdam
Arcadian
Potsdam
Archæan
Archæan
Azoic

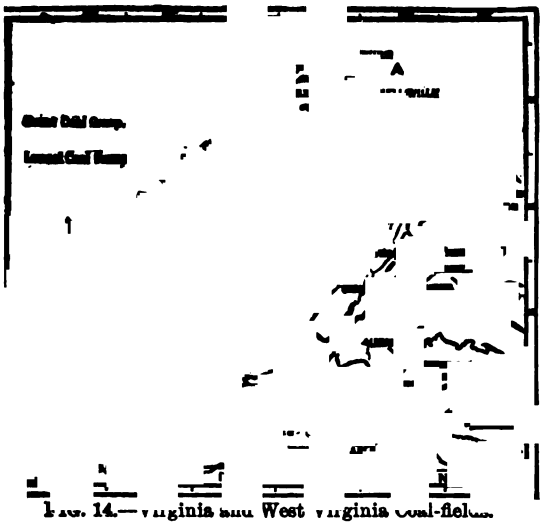


Fig. 14.—Virginia and West Virginia coal-fields.

from 5 to 10 feet of slate and sandstone between. The beds pitch at angles varying from 20° to 60° or 70°, but the average pitch may be assumed to be 25° to 35°.

The "strike" or course of the measures is about N. 12° to 15° E. Although this coal has been known and used since 1700, it is still almost untouched, only about 500 acres of the 120,960 in the field having been exhausted. "These 500 acres are principally divided into about six localities—namely, the mines about Carbon Hill, National, Midlothian and vicinity, and Clover Hill, upon the line of the eastern outcrop, at the extreme northern and southern points, and about in the middle of the border-line of 28 miles in extent; also for about 10 or 12 miles upon the extreme northern point of the western outcrop, in the vicinity of Dover, and the mines south of James River; in all, say 38 to 40 miles of outcrop, the circumferential line of the basin being about 75 miles." The coal of this basin yields about 9000 feet of gas, of 14 candle-power, per ton. Three varieties are found, often in close connection—viz., glance coal, a deep-black, glassy, very brittle coal, having the appearance of hardened pitch; lamellar coal, a brownish-black substance of a dull resinous lustre and comparatively tough; and fibrous coal, a mineral charcoal occurring in thin layers between the other two.

The same coal, but of an inferior character, being much contaminated with iron pyrites, occurs near Farmville, where several seams from 1½ to 6½ feet thick have been partly explored. It has also been found in the field extending from Danville into North Carolina.

The Richmond basin, although so slow in develop-, lies so close to tide-water, and contains so large a quantity of excellent coal, that it must become an important mining-field in the near future. (See Tables XIII., XIV.)

The *Acquia deposits* extend from Mount Vernon to the Massaponax, 40 miles, their greatest width at Potomac Creek or at the Massaponax River, about 8½ miles—comprising in all a superficial area of 174 square miles.

The *Farmville deposits* contain the two isolated basins n the north and south side of the Appomattox at aville, in Cumberland and Prince Edward counties, wn as the Farmville coal-basin; length about 13 s, and average width 2 miles. Their area is comd to be about 20·5 square miles.

The *Potomac deposits* form the most northern part of this (western) division. Commencing in the State of Maryland, they extend from the north side of the Potomac above the falls, through the counties of Fairfax, Loudoun, and Fauquier, to Robertson's River in Culpeper. Their length is 74 miles, and greatest width 14½ miles, making the entire area of country covered by this formation about 651 square miles.

The *Barboursville field* is a small area in Orange county, on the south side of the Rapidan, of an elliptical shape, about 9 miles long, 2 miles wide, with an area of 14 square miles.

The *James River deposits* contain several occurrences of the formation about Warminster, on both sides of the James River, extending into Nelson, Buckingham, and Fluvanna counties. They consist of isolated, narrow patches stretching for about 18 miles, from the south-west corner of Fluvanna county, about the Hardware River, with a width of about 5 miles, to a distance of about 1 mile below Warminster, on the James. The area is about 40 to 45 square miles.

The *Danville deposits* extend from Falling River, in Campbell county, across the Staunton River, through Pittsylvania county, to the north side of the Dan River, just above Danville, having an area of 260 to 272 square miles.

The *Dan River deposits* have an area of about 14 miles.

The principal rocks in the Virginia Mesozoic formation are sandstones and shales of various grades and colors; occasionally conglomerates and limestones, fireclays and igneous rocks, are met with. In some places the igneous rocks have penetrated the series of sedimentary rocks, which display a great variety of color, texture, and solidity in rapidly-changing strata. The coal of the beds is mostly bituminous in character, caking readily, and is excellent for gas-making. It consists of thick laminæ of bright jet, highly resinous, often alternating with thinner dull-black laminæ. Its specific gravity, according to Profs. O. P. Hubbard and B. Silliman, is 1·292, according to Prof. Johnson, 1·246; and it weighs 2075 pounds to the cubic yard. It contains from 30 to 38·5 per cent. of volatile matter, 59 to 66 per cent. of fixed carbon, an average of 5·58 per cent. of ash, and 0·6 to 1·7 per cent. of sulphur.

The Mesozoic anthracite is hard, of iron-black color, sub-metallic lustre, conchoidal fracture, and closely resembles the true anthracite, especially in the Dan River deposits.

West Virginia.—In proportion to its size, no State surpasses this in the variety of coals and area of coal-measures. Out of fifty-four counties, but six are destitute of coal. In many, however, the coal is deeply buried.

The First coal-field is the Potomac basin, a continuation of the Cumberland coal-field of Maryland. At Piedmont, Mineral co., the Pittsburg seam is worked 14 feet thick, having a 1½-inch slate parting 4 feet from the floor. The entire thickness of coal is mined, but as it is here semi-bituminous, having lost a portion of its volatile matter, it is unfit for gas-making. It is, however, a good steam coal. The next is the *Preston county basin.* The Upper Freeport bed is worked here. At the Austin mine the coal-seam is 8 to 9 feet thick, but only the lower 4 feet is first-quality coal. The coal is coked. The Kingwood coal is worked 4½ feet thick. The *Monongahela basin* has five beds of coal—the Lower Freeport, 4½ feet; Pittsburg, 10 feet (9½ feet clear coal); Redstone, 5 feet; Sewickley, 6

feet; Waynesburg, 5 to 6 feet. The Pittsburg bed is the only one worked to any extent. In this basin it makes valuable gas coal, but is high in sulphur. The coke is hard and tough. Near Clarksburg, Harrison co., the Pittsburg bed is found 9 feet thick. Near Wheeling, Ohio co., the same bed is from 5 to 7½ feet thick (5 feet worked).

Gas coals are mined in Marion, Taylor, Ritchie, and Preston counties, on the line of the Baltimore and Ohio Railroad. The beds are from 6 to 11 feet thick. The Clarksburg region contains very rich beds, from 10 to 12 feet thick. They analyze as follows:

	Clarksburg bed.	Cannel.
Volatile matter	56·74	49·21
Fixed carbon	41·66	45·43
Ash	1·60	5·36
	100·00	100·00

Gas made per gross ton, 12,839 cubic feet, 16 candle-power; coke, 37½ bushels, of 45 pounds.

West Virginia Section [*W. B. Rogers* (*abridged*)].

Lower Coal Group.

Nos.		Feet.	
1 to 5.	Shales and sandstones	46 to 64	
6.	*Coal A*, friable	1½ to 2½	
7.	Sandstone and shale	30	
8.	*Coal B*	1	
9 to 13.	Sandstones, shales, limestone, iron ore	17 to 67	
14.	*Coal C*	1 " 2	
15.	Shale	12	
16.	*Coal D*, friable	3½ to 4	
17.	Shale	30 " 40	
18.	*Coal E*, thin	1	
19.	Shale	5 to 6	
20.	Mahoning sandstone	60 " 70	
	Total		299

Barren Measures.

21–29.	Shale, sandstone, limestone	144	
30.	*Coal F*, poor	1 to 1½	
31–33.	Shales and sandstone	53	
34.	*Coal G*, slaty	2½ to 3	
35–38.	Shales, conglomerates, sandstones, limestone	201	
39.	*Coal G*	2	
40–41.	Limestone and shales	16	
	Total		420

Upper Coal Group.

42.	*Coal H* (Pittsburg)	6½ to 9½	
43, 44.	Shale and limestone	22	
45.	*Coal I*, redstone	3 to 4	
46–52.	Shale, limestone, and sandstone	31	
53.	*Coal J*, Sewickley	5½	
54–65.	Shales, sandstones, and limestones	211	
66.	*Coal K*, Waynesburg and two smaller seams	7½	
67, 68.	Shales and sandstones	20 —	310
	Total		1029

The *New River and Kanawha coal-fields*, the most important fields in the State, contain a better quality of coal of several kinds, and a large quantity. They are well developed naturally by the deep cañon-like channel of the New or Kanawha River, exposing the beds at different elevations in the sides of its rocky boundaries.

The Kanawha coal-region proper lies on the Kanawha River, below the junction of the New and Gauley rivers, and along its branches, Coal River, Pocotalico, Elk, and Greenbrier creeks, where the beds are exposed. The strata rise gently from the mouth of the Elk to the falls of the Kanawha. Above this point the strata dip to the south-east, and then gradually rise to Gauley Mountain. A band of black or bluish-black siliceous rock is seen several hundred feet above the river, and marks the boundary between the Lower and Upper coal-measures. Its thickness is in some places 6 feet. Farther up the Gauley River it is found forming the tops of the hills. Thirty miles north from Charleston the coal-seams below the black rock are exposed. Two broad undulations return the strata above the river. Four beds of coal are above water-level. At a distance of 60 feet above the river is a 6-foot bed, affording the best coal; 45 feet higher is a 1-foot 6-inch bed; 200 feet higher, a 4-foot bed; and 150 feet higher, a 4-foot bed; 266 feet above this occurs the black flinty shale. Some of these coals are good gas coals, others hard splint and cannel.

The New River coal-field lies in Fayette and Raleigh counties, bordering for forty miles the New River from Quinnimont to Kanawha Falls. This region contains the bituminous and semi-bituminous steam and coking coal. The mountains rise abruptly to a height of 800 to 1200 feet. The coal outcrops on the river, showing two workable beds with over 3 feet of coal. Farther back from the river, in the high hills, are seen three more beds. The measures have a dip of 75 to 100 feet to the mile. The coal is soft and easily mined, ventilation and drainage being readily obtained. This coal makes an excellent coke, showing a better analysis than the famed Connellsville coke of Western Pennsylvania. At Quinnimont the seam worked is 3 feet thick, and is 1000 feet above the river, being brought down a long plane to the coke-ovens. The coal is a soft semi-bituminous, yielding 63 per cent. of coke. Sixteen miles down the New River, at Fire Creek, a higher seam is worked. The coal is less friable at Hawk's Nest. Thirty miles west of Quinnimont the Nuttall vein is worked at an elevation of 75 feet above the river, having fallen 1500 feet in thirty miles. At Ansted, 3 miles north-east of Hawk's Nest, a bed of the Lower coal-measures is worked, the thickness being 11 feet. This region is developed and brought into connection with markets by the Chesapeake and Ohio Railroad. The shipments for 1880 and 1881 were as follows:

	1880.	1881.	Gain, 1881.
Cannel	43,180	25,183	
Gas	526,990	229,564	143,577
Splint and block		177,786	
New River and other steam		263,517	
Coke	36,374	77,376	41,002
Total movements	606,444	773,426	166,982

The increase in the total movement was one of over 27 per cent.; that in movement of bituminous coal, exclusive of cannel, was also over 27 per cent.; the gain in coke movement was one of over 112 per cent. Nor do these quantities represent all the coke made along this road, for the coke output along the Chesapeake and Ohio Railroad in 1881 may be put down as not far from 100,000 tons.

Adding the cannel to the other gas coal, this shows that over 250,000 tons of gas-making coal were sent to market over the Chesapeake and Ohio Railroad in 1881. But this does not represent the production of these coals on the Great Kanawha (nor does the return of "splint and block" represent the output of those kinds there), for a large proportion of the output of these coals in that region is sent down the rivers in barges.

TABLE XV.—*Analyses of West Virginia Coals and Coke—New River Region.*

Locality.	Moisture.	Fixed Carbon.	Vol. Matter.	Ash.	Sulphur.
Coals:					
Quinnimont Lump	0·76	79·26	18·65	1·11	0·23
" Slack	0·83	79·40	17·57	1·92	0·28
Fire Creek coal	0·61	75·02	22·34	1·47	0·56
Longdale (Sewell)	1·03	72·32	21·38	5·27	0·27
Nuttallburg	1·35	70·67	25·35	2·10	0·57
Hawk's Nest	0·93	75·37	21·83	1·87	0·26
Ansted	1·40	63·10	32·61	2·15	0·74
Coke:					
Quinnimont	...	93·85	...	5·85	0·30
Fire Creek	0·11	92·18	...	6·68	0·61
Sewell	...	93·00	...	6·73	0·27
Nuttallburg	...	92·22	...	7·53	0·92
Connellsville, Pa.	...	87·26	...	12·00	0·74

TABLE XVI.—*Analyses from Prime's Report on the Centennial Exhibit.*

Locality.	Moisture.	Volatile Combustible Matter.	Fixed Carbon.	Sulphur.	Ash.
Piedmont, Mineral co.	0·82	19·36	75·86	0.71	3·96
Ansten, Preston co.	0·11	31·12	66·29	0·64	2·48
Kingwood, top of bed.	0·34	31·47	65·66	0·58	2·53
Monongahela county:					
Upper Freeport bed.	0·63	28·06	54·28	0·77	17·03
Pittsburg "	0·39	38·64	54·77	2·54	6·20
Redstone seam	0·37	37·88	54·36	2·87	7·39
Sewickley bed	0·44	35·78	54·31	3·10	9·47
Waynesburg seam,	0·74	35·36	56·35	0·71	7·55
Despard, Harrison co.	...	40·00	53·30	...	6·70
Murphy's Run, "	1·58	37·10	49·08	2·84	9.40
Wood's Run, Ohio co.	1·74	42·97	50·99	2·88	4·30
Hartford, Putnam co.	3·43	44·38	46·88	1·57	5·31
Osborn, Wayne co.	2·30	40·43	48·72	0·76	8·55
Cannel Coal.					
Falling Rock Creek, Elk River	...	43·20	50·80	...	6·00
Peytona, Boone co.	...	46·00	41·00	...	13·00

Grahamite was found in Ritchie co., in West Virginia. The vein is vertical, 4½ feet thick and three-quarters of a mile long; but the mines are now exhausted. Its analyses show 55 per cent. of volatile matter, 42 per cent. of fixed carbon, and 3 per cent. of ash

FIG. 15.—Map of North Carolina Coal-fields.

NORTH CAROLINA.—The *Dan River field*, as already noted, extends into North Carolina. Its length is 40 miles, of which 32 miles are in North Carolina, and its breadth varies from 4 to 7 miles. It contains two beds of semi-anthracite coal, each 18 inches thick, separated by 1 foot of slate. They are of little importance.

The Deep River coal-field is in the form of a trough 30 miles long by 3 wide, and runs south-west from Granville county. It contains five coal-beds, all differing in the character of their contents. The first is a 3-foot bed of highly-bituminous coal, having 32·8 per cent. of volatile matter, 63·8 per cent. of fixed carbon, and 4 per cent. of ash; the second, 1 foot thick, is semi-bituminous, and contains 23·6 per cent. of volatile matter, 72·6 per cent. of fixed carbon, and 4 per cent. of ash; the third, an anthracite, 3 feet thick, contains 6·6 per cent. of volatile matter, 83·8 per cent. of fixed carbon, and 9·6 per cent. of ash; the fourth and fifth are coal only in name, one being plumbaginous slate 2 feet thick, bearing only 10·4 per cent. of carbon to 78 per cent. of ash, and the other, a 4-foot bed of plumbago, containing 16·2 per cent. of carbon and 74 per cent. of ash.

The bituminous coal of this field is valuable for smelting and gas-making, and, like that of the Richmond field in Virginia, awaits only development to form an important addition to the wealth of the State. In some localities bituminous coal of lower quality, semi-bituminous, carbonite, semi-anthracite, and natural coke, are found. The "carbonite" Mr. Heinrich considers only a semi-bituminous coal, generally carrying a large amount of earthy impurities. It is of a dark iron-gray or grayish-black color, dull or semi-metallic lustre, compact and even very tough, but not hard to cut. It contains about 11 per cent. of volatile matter, 80 per cent. of fixed carbon, and from 9 to 20 per cent. of ash; also, considerable sulphuret of iron. Its hardness is 2·5, specific gravity 1·323. This mineral is often called natural coke, but the true natural coke is more porous, has a more metallic lustre, and bears a greater resemblance to artificial coke. It has been formed from bituminous coal by the heat of neighboring igneous rocks.

OHIO.—The coal-field of Ohio, which extends through more than 10,000 square miles of the State, is part of the great Allegheny field. It extends from Geauga county on the north to Lawrence county on the south, and from Jefferson county in the east to Holmes county in the west, its length being about 180 miles and its width about 80 miles. Its greatest development is along the Ohio River between Bellaire and Pomeroy, where the coal-bearing rocks are from 1400 to 1500 feet thick, and enclose thirteen workable beds of coal of an aggregate thickness of 40 to 45 feet. (See figs. 17, 18.) North and west from this line the strata rise towards the margin of the basin, and one after another of the coal-beds comes to

FIG. 16.—Map of Ohio Coal-field.

the surface, till the lowest of the series crops out and marks the limit of the region. The thirteen workable beds found along the Ohio River are not all persistent. Only two of the series—No. 6, or the "Great Vein" of Perry county, where it reaches its greatest development, and No. 8, or the Pittsburg bed—are found of workable dimensions over great areas. Bed No. 1, however, is considered the most valuable wherever found in workable condition. It is the block coal of the Mahoning Valley, called elsewhere "Massillon" and "Jackson" coal, and is a bed of great excellence, its coal, in most places, being especially adapted for smelting iron in a raw state. In the Mahoning Valley it ranges from a mere trace to a thickness of 7 feet, its general workable thickness being from 2½ to 5 feet. It is thinly laminated, and is broken by transverse cleavage into cubical blocks, whence its distinctive name. The faces of the laminæ are often covered with mineral charcoal, and the whole bed is made up of alternate layers of coal and "mother of coal." It is highly prized for furnace use, as it can be dumped into the hopper just as it comes from the mine, without coking or other preparation. The blocks are sufficiently firm to support the weight of the materials with which they are intermingled, and retain their shape, without swelling or softening, until they are consumed. This bed, however, is very uncertain in its localities, and no rule save actual search can be made for assuming where it may be found.

TABLE XVII.—*Analyses of Ohio Coals from Different Beds (Newberry).*

Coal, No.	Locality.	Moisture.	Volatile Combustible Matter.	Fixed Carbon.	Ash.	Sulphur.
I.	Mahoning county.....	2·47	31·83	64·25	1·45	0·56
II.	Holmes co. (cannel)...	2·15	28·65	52·70	16·50	2·13
III.	Holmes co. (cannel)....	3·90	40·50	49·95	5·65	1·55
III.	Yellow creek.....	2·50	36·60	56·30	4·60	2·05
IV.	Coshocton co. (cannel)	1·50	44·40	44·50	9·60	1·72
IV.	Stark co.....	7·00	30·80	59·50	2·70	0·65
V.	Columbiana co.....	1·15	40·45	53·75	4·65	3·51
VI.	Columbiana co.....	1·60	29·29	64·50	4·00	2·80
VI.	Muskingum co.....	3·47	37·88	53·30	5·35	2·24
VI.	Jefferson co.....	1·40	30·90	65·90	1·80	0·98
VII.	Saline co.....	1·70	34·30	59·50	4·50	1·62
VII.	Carroll co.....	2·80	30·20	64·10	2·90	1·23
VIII.	Harrison co.....	2·44	32·36	59·92	5·28	2·62

The State Inspector of Mines' report for 1880 shows 246 collieries in twenty-seven counties.

This coal-region is an excellent illustration of the "peat-bog" theory of the formation of coal. The beds rest on the Waverley sandstone, the upper surface of which was worn into a series of hollows by some erosive action previous to the formation of the coal, and in these hollows the present coal-deposits are found, the original shape being so clearly apparent that the basins are commonly called by the miners "swamps." The coal is always thickest at the bottom of these "swamps," and decreases gradually as it rises, until it runs out at or near the original rim of the basin, unless it is suddenly cut off by a "wash-fault," or seam of foreign matter deposited in the bed of some ancient water-course, which washed away the peat before it had time to harden into coal. Sometimes two or more of these "swamps" are found side by side, the coal-bed being continuous from one to the other, but always very thin on the ridges between them. These ridges are never marked by "wash-faults."

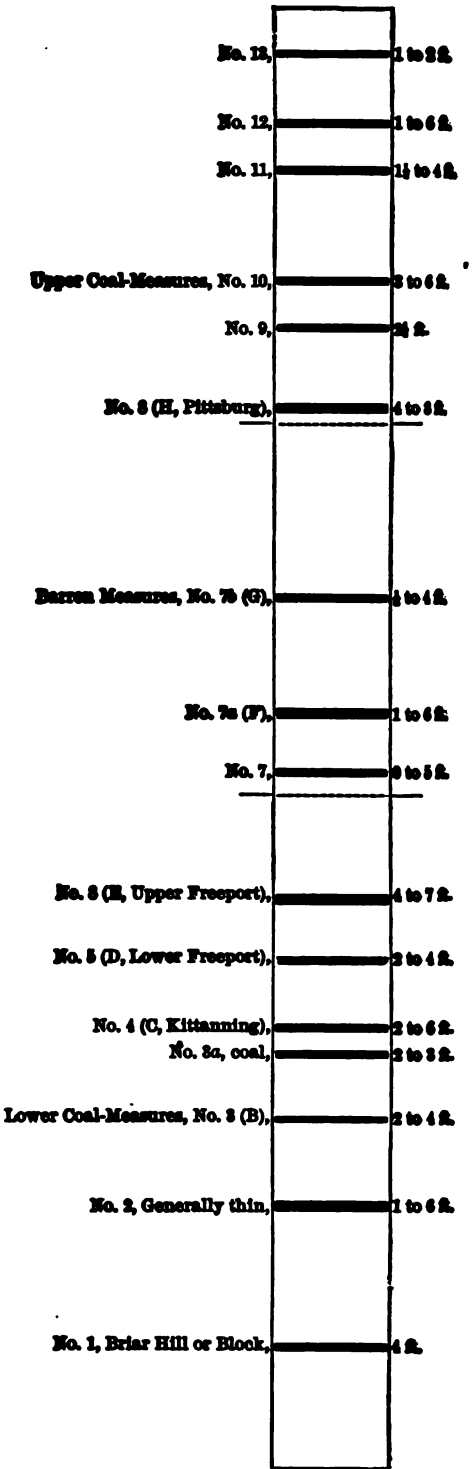

No. 13, 1 to 3 ft.
No. 12, 1 to 6 ft.
No. 11, 1½ to 4 ft.
Upper Coal-Measures, No. 10, 3 to 6 ft.
No. 9, 2½ ft.
No. 8 (H, Pittsburg), 4 to 8 ft.
Barren Measures, No. 7b (G), 4 to 4 ft.
No. 7a (F), 1 to 6 ft.
No. 7, 0 to 5 ft.
No. 6 (E, Upper Freeport), 4 to 7 ft.
No. 5 (D, Lower Freeport), 2 to 4 ft.
No. 4 (C, Kittanning), 2 to 6 ft.
No. 3a, coal, 2 to 3 ft.
Lower Coal-Measures, No. 3 (B), 2 to 4 ft.
No. 2, Generally thin, 1 to 6 ft.
No. 1, Briar Hill or Block, 4 ft.

FIG. 17.—*Coal-Measures of Ohio* [Newberry].
(Scale 200 ft. to Inch.)

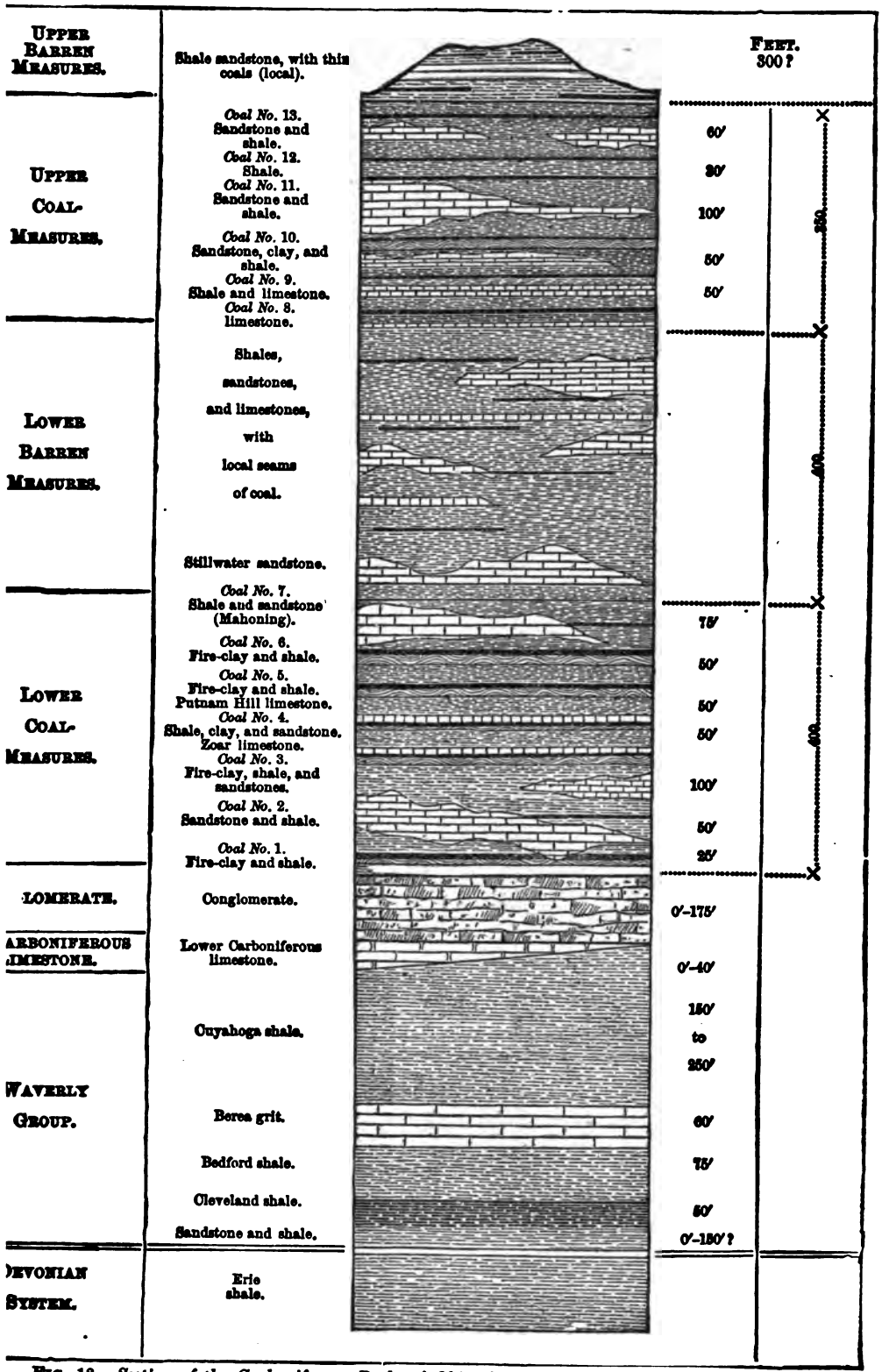


FIG. 18.—*Section of the Carboniferous Rocks of Ohio* [from Prof. J. S. Newberry].

The report of the census of 1880 gives the coal-statistics of Ohio for the year ending May 31, 1880, as follows: Tons of coal produced, 6,437,725; value, $8,281,979; number of large mines, 216; number of employés, 15,622; number of small mines, 383; number of employés, 1350. The number of men employed was 16,331, of whom 13,626 were miners; they received wages aggregating $5,100,547. There were employed 131 steam-engines, of 3835 horse-power and valued at $386,904. The amount employed as working capital is returned as $1,177,328, the value of the plant at $3,258,581, and the value of the real estate at $3,529,931, making a total capital invested and employed in the industry of $12,965,840. On 2,630,108 tons $458,468 were paid as royalty. In the list of counties Perry stands first, with 913,974 short tons, followed by Trumbull with 722,265, Columbiana with 515,602, Belmont with 399,747, Meigs with 359,678, Stark with 347,820, Hocking with 331,170, Jefferson with 324,070, Athens with 310,750, and Tuscarawas with 255,495 tons.

TABLE XVIII.—*Census Statistics of the Coal-mines of Ohio for the Year ending May 31, 1880.*

Counties.	Tons.	Value.	No. of Large Mines.	No. of Employés.	No. of Small Mines.	No. of Employés.
Athens	589,195	$598,898	12	1,219	14	51
Belmont	452,754	456,890	16	716	35	138
Carroll	20,692	27,227	2	43	18	49
Columbiana	541,466	596,264	18	1,332	16	52
Coshocton	62,990	74,494	4	159	11	49
Gallia	19,941	20,311	1	23	16	35
Guernsey	168,480	184,400	5	314	10	34
Harrison	45,860	45,860	3	52	14	72
Hocking	176,852	176,000	4	349	3	5
Holmes	17,460	26,190	1	21	10	25
Jackson	196,452	249,385	18	587	21	72
Jefferson	388,199	350,543	13	768	10	66
Lawrence	118,929	149,105	6	300	4	6
Mahoning	347,635	693,826	15	1,095	1	10
Medina	106,000	170,000	2	312		
Meigs	388,786	469,203	11	1,106		
Monroe	1,600	2,000	...	...	1	8
Morgan	10,520	10,915	...	...	16	34
Muskingum	129,869	133,504	8	181	43	182
Noble	21,520	24,350	1	19	14	31
Perry	1,058,254	1,142,934	19	1,988	8	43
Portage	26,500	60,625	2	132	1	4
Scioto	7,443	10,637	...	...	13	21
Stark	344,397	492,951	15	1,346	31	143
Summit	130,165	224,413	7	494	4	63
Trumbull	673,206	1,383,370	14	2,041	7	11
Tuscarawas	246,229	309,352	15	605	27	105
Vinton	61,908	82,882	2	190	12	30
Washington	28,800	30,200	1	30	9	19
Wayne	55,623	85,250	1	200	14	42
Totals	6,437,725	$8,281,979	216	15,622	383	1400

FIG. 19.—Map of Kentucky Coal-fields.

EASTERN KENTUCKY.—Kentucky contains portions of two great coal-basins, the eastern part of the State being covered by the Appalachian basin, the western by the Illinois basin. The coal-field of the eastern portion extends westward from the State boundary on the east, and is limited on the west by an irregular line running north-east and south-west through the counties of Greenup, Carter, Morgan, Powell, Owsley, Jackson, Laurel, Pulaski, and Wayne. It includes fifteen counties and parts of five others, covering altogether 8983 square miles. The coal-measures are divided into two series, the upper one corresponding to the Lower coal-measures of Pennsylvania and Ohio. These upper measures contain the best coal. The general dip of the measures is to the south-east. A great dislocation divides the coal-field into two zones—one north-west of Pine Mountain, and the other south-east. The entire thickness of the measures is between 2500 and 3000 feet. Twelve coal-beds are known to exist above the great conglomerate, and two or three are below it. The latter occur all along the western margin of the field, being from 4 to 5 feet thick. Greenup county, on the Ohio, has a good cannel coal. The sub-conglomerate coals are similar to the same class of coals in West Virginia on the Kanawha.

The *first bed* above the conglomerate is equivalent to the Ohio Briar Hill coal. It varies in thickness from 15 inches to 5 feet. The coal is generally splint, or free-burning. Near the Ohio the coal is not as good as it is a few miles back from the river. The *second bed* covers a wider extent of territory, but is not very good. It is from 2 to 2½ feet thick. The *third bed* (the Kittanning coal of Pennsylvania) varies from 2½ to 6 feet in thickness on the Big Sandy River. The coal is usually bituminous, though with a streak of cannel. The *fourth bed* is less persistent than No. 3. The coal is cannel, with sections of bituminous. It is from 2½ to 5 feet thick, but in some places is wanting. It is sold as the Hunnewell cannel. The *fifth bed* is from 38 to 40 inches thick. It is mined at the Buena Vista furnaces, and is of good quality. The *sixth bed*, Keys Creek or River Hill coal, is over 2 feet thick. The *seventh bed* is the Coalton coal, which is extensively worked. The coal is a splint and good for furnace use. It is from 3½ to 6 feet in thickness. *Coal No. 8* is mined at Coalton, where it is 4 feet thick, but is inferior in quality to No. 7. *Nos. 9, 10,* and *11* are found in Lawrence county. They are of little value.

TABLE XIX.—*Analyses of Kentucky Coals [from Owen's Geological Survey of the State].*

No. of Bed.	Locality.	Moisture.	Vol. combustible matter.	Fixed carbon.	Ash.	Sulphur.
1	Lawrence co.	3·50	36·30	57·20	2·90	1·15
2	Carter co.	4·10	34·60	55·25	4·77	1·41
3	Greenup co. (av. 5 analyses)	3·56	35·00	52·34	9·02	2·89
4	Carter co.	0·60	66·30	28·30	4·80	1·22
5	Lawrence co.	3·20	32·30	53·00	11·50	1·29
6	Boyd co. (av. 4 analyses)	3·27	33·77	54·51	8·91	1·54
7	Coalton (av. 12 anal.)	5·19	32·04	55·59	6·71	1·08

WESTERN KENTUCKY.—The extension of the Illinois coal-field into Kentucky covers the extreme north-western portion of the State, and includes ten counties, with parts of five others, having an area of 3888 square miles of coal-measures. The number of coal-beds in this region has been differently stated, an extensive fault and upheaval making it difficult to identify them. There are, in places, twelve beds, but the number varies with the locality. In the analyses below, the beds are lettered, starting from the top and going to the base of

There are but four principal seams.
..., commonly known as "No. 12," extends ge area, but is not mined extensively, being s surface and not in good working condition. kness varies from 3 to 6 feet, and the charac- ges from a "firm, glossy, black, dense" coal ft and rather fragile" coal. It cannot be used ces in the raw state, but makes an excellent

"*B*" ...ntrustworthy and full of slips. It is ...han "A," but has a clay parting. A ...e up of the bed is a rich gas coal.
D"—"No. 9" of the geological survey—va- ...l quality. It is usually hard and compact, ...f fibrous coal. It has a uniformly large ...f sulphur, occurring in the coal in bands. ...f the bed is 4 to 6 feet. It has a good ... ...ked extensively.
"*E*" ...f good quality, but varies in thickness, ... absent entirely, and sometimes being ... thick.
F, *G*, *H*, *I*, and *J* are not of great value. 5 feet, "I" is from 1 to 3 feet, and "J" ... to 3½ feet in thickness. *Coal* "*L*" is ex- ..., but poor.
...ridge cannel is rich in gas and oil. ... is from 22 to 38 inches thick, and is re- dense and tenacious. The coal is so rich vious to the discovery of petroleum, oil ed from it. The following table of anal- d from Prime's *Centennial Report on*

...XX.—*Analyses of Western Kentucky Coals.*

Bed.	Moist- ure.	Vol. matter.	Fixed carbon.	Ash.	Sul- phur.
.....	4·15	33·14	55·71	7·00	1·87
.....	3·65	38·40	51·87	6·06	3·12
...l layer).....	4·60	40·10	51·35	3·95	1·49
...rage).....	3·82	35·41	52·11	8·41	3·33
...istian co.).....	3·70	32·56	50·04	13·70	3·72
...rage).....	4·23	33·21	54·19	8·35	1·50
...idge cannel.....	1·44	62·40	28·20	7·96	2·44

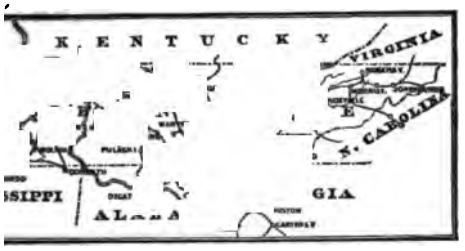


FIG. 20.—Map of Tennessee Coal-fields.

—Through the eastern part of Tennessee ... Cumberland table-land crosses the State in ... and south-west direction. The coal-fields ... coextensive with this table-land. The ... especially on the west, are irregular, being ... by valleys. The coal-measures cover an area ... square miles, or one-eighth of the area of the ... At the northern line the table-land is 71 miles ... toward the south it narrows, and is but 50 miles ... region has a generally level top. East of ... the Sequatchie Valley divides it from the ... ...hward into two parallel arms or ex- ... ...ey is 60 miles long, and but 3 to 5 miles wide. The lower Carboniferous rocks are 1200 feet thick in Tennessee. In the high ridge of the table-land the measures are much thickened, and have a total thickness of 2500 feet. There are nine seams of coal, of which six are over 3 feet in thickness. The sub-conglomerate coals embrace the whole coal-region of the State except the north-eastern and a portion of the eastern sections. The Sewanee division is the arm between the Sequatchie Valley on the east and the Alabama line. The main Sewanee seam is from 3 to 7 feet. There are four thin seams below this. The coal is generally good, but varies. In Grundy county the seams sometimes swell out to 3, 4, and 9 feet. The Upper coal-measures, in which is the Sewanee coal, cover one-fourth of this division of table-land. The Sewanee coal is of good quality, with little sulphur, and is semi-bituminous. It is very fragile, owing to its peculiar structure. The Ætna coal-seam is in the Lower coal-measures, and is 3 feet thick. The principal mines are in Marion and Grundy counties. The sub-conglomerate coals are at intervals of 10, 50, 20, and 25 feet below the conglomerate, and are seldom over 3 feet, or of workable thickness. At the Ætna mines five seams of coal are opened—three seams, the "Walker," "Kelly," and "Ætna" beds, being 5 feet 6 inches, 4 feet, and 3 feet thick, respectively.

TABLE XXI.—*Analyses of Coals in Tennessee.*

	Carbon.	Volatile matter and water.	Ash.
Addison's Creek, Cumberland Mountains.....	83·22	9·00	7·78
Crow Creek.....	77·70	14·00	8·30
Sewanee Mining Co.....	79·56	14·21	6·25
Tracy City.....	65·50	29·00	5·50
Upper Seam, Marion.....	59·50	38·00	2·50
Etna.....	74·20	21·39	4·41
Chattanooga, Hamilton co.....	63·90	26·80	9·30
Coal Creek, Anderson.....	55·00	40·00	5·00

FIG. 21.—Map of Alabama Coal-fields.

ALABAMA.—This State contains the southern extremity of the Appalachian coal-field, which extends into the upper portion of the State and covers about 5500 square miles. There are three separate basins, the largest and most important being the *Warrior* coal-field, extending nearly across the State, covering the whole of Hancock and Walker and parts of the surrounding counties. Its shape is peculiar, being narrow at the north-east, and widening greatly at the south-west extremity. Its area is 5000 square miles. To the south-west of this field, in Bibb, Shelby, and Jefferson counties, lies the *Cahaba* coal-field. It lies N. E. and S. W., is 75 miles long and 10 miles wide, but is narrow at the northern end. It contains from 180 to 200 square miles. The *Coosa* coal-field lies east of the Cahaba, and on the north-west side of the Coosa River. It is 36 miles long by 8 wide, and contains 150 square miles.

The coal-measures of Alabama contain ten or twelve beds of workable thickness, from 2 feet upward. They are separated into two groups, as in the other portions of the Appalachian coal-basin. The lower group contains seven or eight beds, with an aggregate thickness of from 30 to 35 feet; the upper group contains three or four beds, with a total thickness of 12 feet. The lower coals are separated by an enormous thickness of rock. The coals of the Cahaba basin are generally free from shale partings (according to R. P. Rothwell), and are the best in the State. The largest bed is 12 feet thick, of good coal. The beds are given in the following order, the highest in position being the first:

No. 9, Helena seam	4	feet	0	inches.
" 8, Beaver Dam seam	3	"	6	"
" 7, Little Pittsburg seam	2	"	0	"
" 6, Moyle "	2	"	0	"
" 5, McGinnis "	2	"	6	"
" 4, Buck "	3	"	6	"
" 3, Cahaba "	3	"	3	"
" 2, Cahaba "	4	"	0	"
" 1, Gould "	3	"	6	"
Total	28	feet	3	inches.

A great fault limits the Cahaba coal-field on the east.

The *Warrior* coal-basin is best developed in Jefferson co. The coal-seams are from 2 feet to 6 feet in thickness, and the coal is excellent for steam purposes. The following analyses are from the reports of E. A. Smith, State geologist:

TABLE XXII.—*Analyses of Alabama Coals.*

Bed.	County.	Moisture.	Vol. matter.	Fixed carbon.	Ash.	Sulphur.
CAHABA BASIN.						
Cahaba	Shelby	1·66	33·28	63·04	2·02	·525
McGinnis	"	1·91	32·65	63·91	1·53	·630
Moyle	"	1·93	32·84	59·64	5·59	3·780
Little Pittsburg	"	2·05	33·47	62·20	2·28	·641
Conglomerate	"	2·13	30·86	64·54	2·47	1·480
Helena	"	2·54	29·44	66·81	1·21	·528
Montevallo	"	2·13	27·03	66·22	4·62	·502
WARRIOR BASIN.						
Townley	Walker	3·007	29·084	63·352	4·557	·71
Jagger	"	3·091	29·044	56·537	11·328	·574
Burnett s.	Marion	3·694	35·380	58·517	2·409	1·730
Pratt Co.'s	Upper Jefferson	1·474	32·288	59·503	6·735	1·224
"	Lower "	1·529	30·683	63·686	4·102	·612

GEORGIA.—The coal-measures of the Appalachian basin enter the extreme north-west corner of Georgia (see Map of Tennnessee), and occupy an area varying from 150 to 170 square miles, according to different authorities—viz., Taylor, 150; Hitchcock, 157½; Rogers, 170 square miles. This field extends from immediately south of Chattanooga, Tenn., in a south-west direction, and enters Walker co., Ala. Samples of coal from the field in Georgia show it to be similar to coals of Alabama and Tennessee. The following analysis is given by Prof. Safford:

Ash	2·50
Carbon	40·75
Volatile matter	56·75
	100·00

FIG. 22.—Map of Michigan Coal-field.

MICHIGAN.—A detached field of coal is found in Michigan. It is situated in the central part of the southern portion, embracing nearly thirteen counties, with an area of coal-measures of 6700 square miles. The measures occupy a shallow basin, the longest axis being nearly co-incident with the axis of Saginaw Bay. The measures are 123 feet thick, and contain one seam of bituminous coal 3 or 4 feet thick; toward the centre of the basin there are several other beds. On Six-mile Creek is the greatest thickness of coal, one seam being 5 feet, and three others 2 feet, in thickness. In quality the coal is inferior, and it is used only for home consumption, not competing with that of adjacent States. Its analysis is—fixed carbon, 45; volatile matter, 49; ash, 2·0, water, 2·0, sulphur, 2·0 per cent.

INDIANA.—The Illinois coal-field extends [illegible] western part of Indiana, covering an area in [illegible] of about 6500 square miles. Prof. E. T. Cox, [illegible] geologist, reports the coal-measures to be [illegible] feet in thickness. The coal lies in two well- [illegible] zones, the eastern extending along the border [illegible] field from the Ohio River, in Perry county, to [illegible] county in the north. This zone is 150 miles lo[illegible] with an average width of 3 miles. Its area is ab[illegible] 450 square miles, and its contents are non-coking [illegible] nous, or block, coal. The beds are traversed by a [illegible] seam, which separates the coal into cubical b[illegible] whence its name. This peculiar [illegible]re makes coal easy to mine and handle, and [illegible]lly without blasting. Block coal has a [illegible] ture, and is composed of thin al[illegible] but vitreous coal and fibrous mi[illegible] slate, it splits readily into thin she[illegible] difficulty "across the grain." Its [illegible] tion is similar to that of the

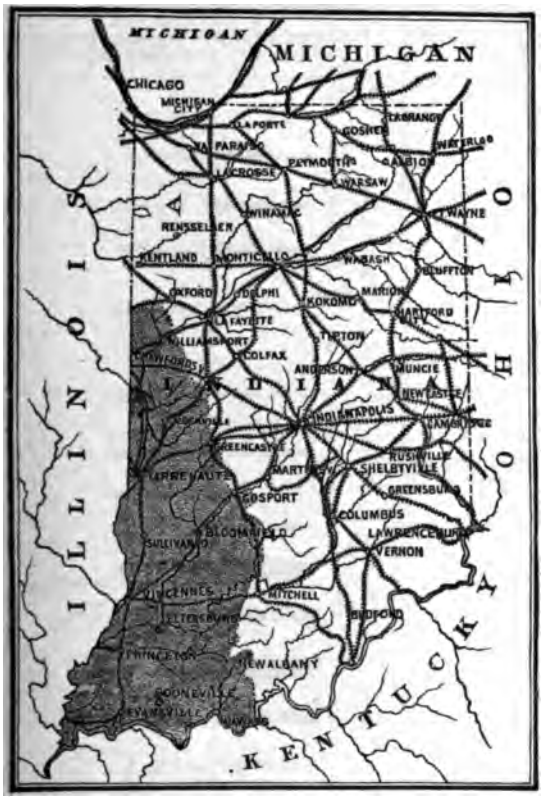


FIG. 23.—Map of Indiana Coal-field.

them, it does not swell or run together when burning, but retains its shape until entirely consumed, when it leaves a small quantity of white ash without a trace of clinker. In most mines it is remarkably free from sulphur.

The western zone comprises rather more than 6000 square miles, and contains three or more workable beds, besides a number too thin for working. They average from 4 to 10 feet in thickness, and have a total average thickness of 10 feet, with a maximum of 20 feet. The beds in this State are lettered from A to N, but C, D.

TABLE XXIII.—*Analyses of Indiana Coals by the State Geological Survey.*

	Moisture.	Volatile matter.	Fixed carbon.	Ash.
Coking Coals:				
Parke co.	4·50	45·50	45·50	4·50
—livan co., coal "M"	2·35	45·25	51·60	0·80
y co.	7·00	39·70	47·30	6·00
ncer co., coal "L"	8·50	45·00	46·00	2·50
Coals:				
y co.	8·50	31·00	57·50	3·00
tin co.	2·50	44·75	51·25	1·50
rieas co.	5·50	36·00	53·50	5·00

E have not been developed. F, I, and K are the block coals; L is the "Mammoth" bed. In n county its thickness ranges from 5 to 7 feet, by le or fire-clay partings into two or more he er of which contains from 30 to 36 inches co ile upper is coking coal. "K" Dav ounty; it is a bright, nds a ready market in points. Its specific gravity is 1·294; weight, 80·87 pounds per cubic foot. Further data respecting the Indiana coal-beds will be found in the accompanying cross-sections:

ILLINOIS.—The coal-field of Illinois occupies an area of 36,800 square miles. The coal-measures are not as thick as those of the Appalachian field, and the beds, of which there are six of workable size, are irregular, often wanting where they should be found, and containing an inferior quality of coal. The total thickness of coal is 24 feet. The field covers all that portion of Illinois south of an irregular line running south-east through Henry, Bureau, La Salle, Grundy, Kankakee, and Iroquois counties, with the exception of a narrow strip along the eastern edge of the Mississippi River. The Carboniferous system contains a thickness of 2500 feet of strata, but the coal-measures proper are but 500 feet thick. The lower coal-seams are found only in the central and southern portions of the State, while the northern portion contains only the upper seams. This distribution of the coal-measures is the result of a sinking of the northern portion during the coal era. The country generally is level prairie, but 42 miles above Cairo is an elevation and fault running nearly east and west across the southern portion of the State. Another axis of disturbance extends north-north-west and south-south-east from La Salle to the Wabash River, in Wabash county. This disturbance took place after the deposition of the coal-formation, and it is the only disturbance of a general character.

There are ten seams of coal in a vertical thickness of 600 feet—six from 2½ to 6 feet, and four from 2 feet to a few inches. (See fig. 24.) They are numbered and described from the bottom up, as follows: No. I., 2 to 3 feet of coal, quality fair, uncertain in the north; No. II., 2 to 5 feet of coal, excellent quality and much worked; No. III., 3 to 4 feet, somewhat local, found in Schuyler county; No. IV., 4½ feet, only found at Cuba, Fulton county. No. V. is the most reliable coal; it is of good quality and free from sulphur, and is extensively worked near Springfield. No. VI., 3 to 7 feet. In the southern portion of the State it is quite thick, from 6 to 7 feet. In Peoria, Fulton, and La Salle counties it is 4 to 5 feet thick. The coal is not as good as No. V., and is generally lighter and softer. The seams above this are not thick enough to be workable. The coal is generally reached by shafts from 200 to 400 feet deep. The dip is very slight and mining is easy.

In the *Du Quoin* district, Perry county, the fault brings the Lower coal-measures near the surface, and seams of 6 and 7 feet are within 50 or 75 feet of the surface, and easily accessible. Seams Nos. V. and VI. are worked. The coal is of excellent quality, and has a good clay-shale roof. The basin is subject to some irregularities.

In the *Big Muddy* district, Jackson county, the coal occurs near the surface. The lower seams produce a good block coal, similar to that of Indiana, which, owing to the proximity of St. Louis, is valuable for iron manufactures. The coal, however, is not as good as the block coal of Indiana.

From the *Belleville* district, St. Clair county, St. Louis obtains most of its bituminous coal. The county contains 450 square miles of coal, embracing five beds, two of economic value. Coal-seam No. VI. is principally worked. Its general thickness is 5 to 7 feet, with limestone roof. The coal is regularly stratified. The lower coal-seams contain more sulphur and the quality varies.

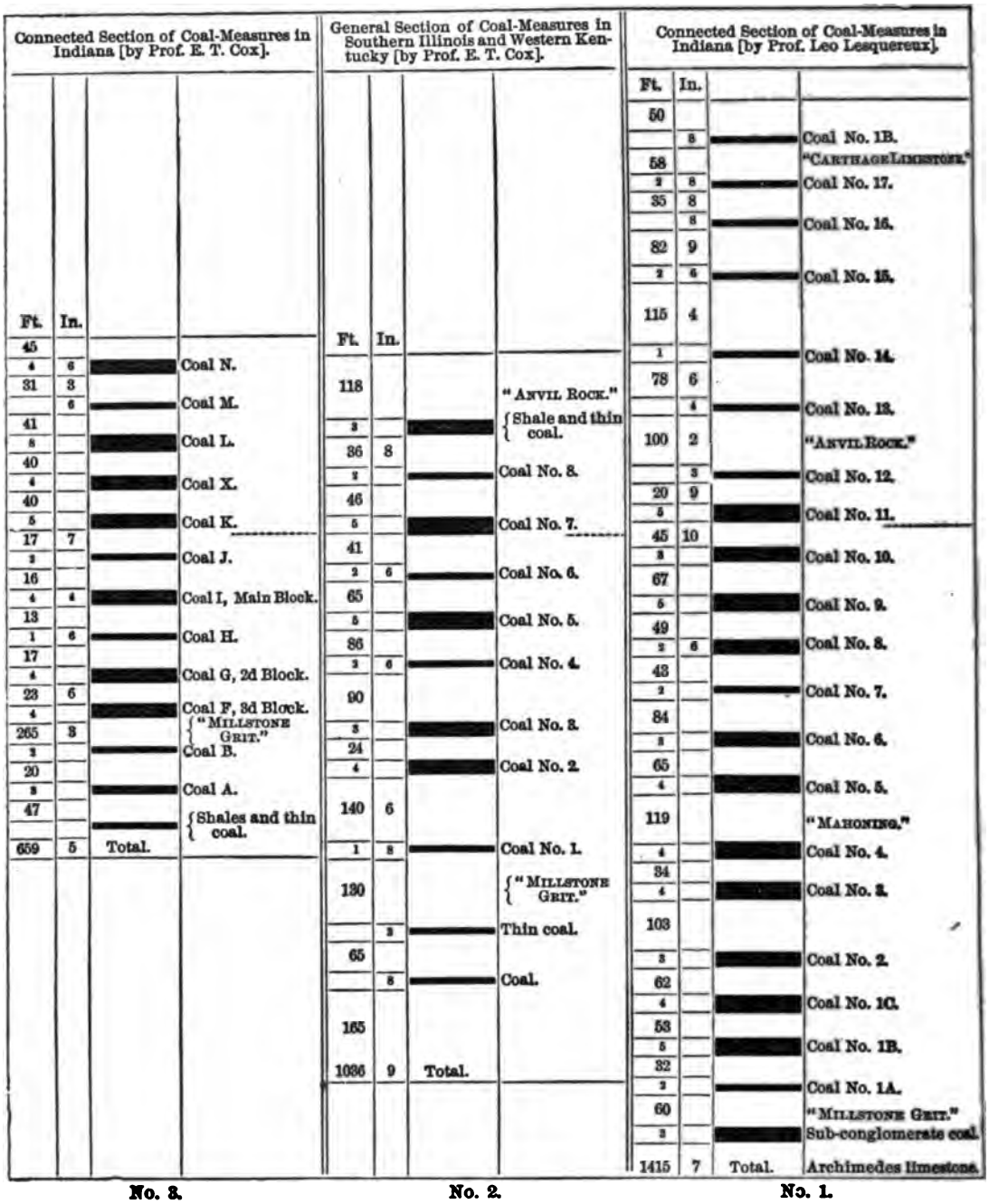


FIG. 24.—*From Prof. E. T. Cox's State Geological Report of Indiana for 1870.*

At *Neelysville*, Scott county, coal is extensively mined, but a still more productive region is at *Danville*. The coal is a fat, caking coal, 6 feet thick, lying nearly level. It contains sulphur, but in such a way that it can be easily thrown out. Its main fault is friability and tendency to slack on exposure. It makes good, strong steam coal.

The coal of *La Salle* is of importance from its proximity to Chicago. The anticlinal axis before mentioned occurs in this county. East of the axis the Lower coal-measures are only found with one workable bed, inclined very slightly. West of the axis both lower and upper coals are found. Between the Illinois River on the south and the Vermilion River on the east there are

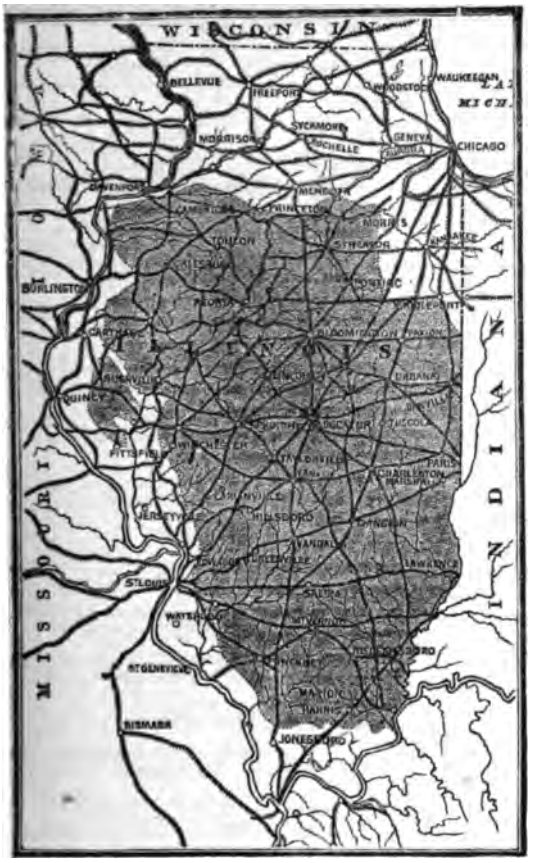


FIG. 25.—Map of Illinois Coal-field.

hree workable beds. The upper seam, No. VI., is 4½ o 5 feet thick; No. V., 3 to 9 feet, usually 6 feet; the ower, No. II., 4 feet. The middle bed, No. V., is the popular. The upper bed is a light, dry, free-burn- oal and a good steam coal, but is hard to mine. Idle bed is purer coal than No. VI. The lower is most highly bituminous, cakes in burning, and hows off heavy soot. Its drawback is too much sul- hur.

Tal in all its bearings, there is perhaps no more nt sting coal-field than that locally known as the *Wil- ington* district, on account of the superior qualities of s product as a household and steam fuel when com- ared with other Illinois coal, and its geological position. he territory underlaid with coal to which this name as originally given embraced a small area, including nly the south half of sections 31 and 32 (township 33 orth, range 9 east) in Wilmington township, and sec- ons 5, 6, 7, 8, 17, 18, 19, 30, and 31, with occasional utliers in sections 3, 4, and 9, and possibly in sections 0, 28, 29, 30, and 32 (township 32 north, range 9 ast) of Reed township, in Will county, comprising 11 quare miles of workable coal within the known basin. orings indicate the presence of coal in sections) . 33 in Wilmington township, but of a soft, . nature, unprofitable for mining (*Jasper Johnson E.*).

There is but one workable seam of coal in *Will county*, though many persons still believe there is another bed below the one now being worked all over the field. The quality of Illinois coal is lowered by the presence of much sulphur and a large amount of moisture. The valuable feature is the quantity.

The following table of analyses shows the character of the various Illinois coals in the principal regions:

TABLE XXIV.—*Analyses of Illinois Coal.*

	Moisture.	Volatile matter.	Fixed carbon.	Ash.
Du Quoin Region.....	8·5	40·4	48·1	3·00
Big Muddy "	6·5	31·2	60·8	1·50
Belleville Region:				
Caseyville.....	6·0	33·8	55·2	5·00
Belleville	5·5	39·5	49·6	5·4
Belshas	8·10	35·56	47·74	8·60

COAL IN IOWA.—The Missouri coal-basin occupies nearly one-half of the State of Iowa. The measures are separable into upper, middle, and lower divisions. The whole field extends in a north-west and south-east direction through the State, from Van Buren county to Keokuk, Marshall, and Harden counties; then west to Fort Dodge, Webster co.; and on the south a line through Harrison to Madison and Lucas counties is the limit. The Lower coal-measures comprise the productive coals of the strata, the Upper formation containing but one bed of coal, with a maximum thickness of 20 inches. The thick-

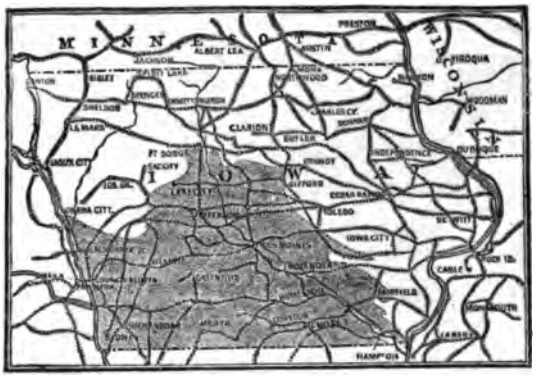


FIG. 26.—Map of Iowa Coal-field.

ness of the Lower coal-measures is 200 feet. They contain two beds of coal, irregular in thickness, swelling sometimes to 5 feet. (See section below.) On the Des Moines River such a thickness of workable coal is found. The coal north of this river is detached in patches and isolated basins, the great body being south of the river. In Webster county there are three beds of workable coal, the upper one, 5 feet thick, being the best. In Hamilton county one bed, 4 feet thick, is found. In Boone county the coal is very deep and not much mined. There are two distinct beds, the lower 4 feet and the upper 2½ to 3 feet thick. At Des Moines the coal is mined from three seams in close proximity. The Middle coal-measures occupy only a small, narrow region. The Upper measures, as before said, are generally distributed, but contain little workable coal. The coals are all fat, adhesive, and close-burning bituminous, similar in structure to those of Illinois, but of inferior quality. The percentage of water is quite high and variable.

An average of sixty-four analyses made by the State

geologist gives—moisture, 8·57; volatile combustible matter, 39·24; mixed carbon, 45·42; ash, 6·77 per cent.

Iowa Cross-Section [by C. A. White].

Nos.		Thickness, Ft.	In.
	Lower Division.		
	Sandstone and shales	200	0
	Workable beds, about	2–3	
	Middle Division.		
1–3.	Shales, limestones, etc	43	0
4.	*Coal*, Lacona	1	8
5–7.	Sandstones and shales	40	0
8.	*Coal*, Panora	1	0
9–15.	Shales, etc	26	8
16.	*Coal*, Wheeler	1	3
17–32.	Shales, sandstones, limestones	152	0
33.	*Coal*, Marshall	1	8
34–41.	Shales, etc	55	0
42.	*Coal*, Lynsdale	2	0
42, 44.	Shales	14	0
	Upper Division—Muterset Section.		
2–5.	Limestone, etc	84	0
6.	Coal	1	6
7–16.	Limestones, clays, carbonaceous shales, etc.	94	0
	Total	717	1

MISSOURI.—The geological survey of Missouri, by Mr. G. C. Broadhead, shows that the coal-measures comprise an area of 22,995 square miles, including 160 square miles in St. Louis county, 8 in St. Charles, and a few outliers in Lincoln and Warren; the remainder lying in North-west and Western Missouri. There are 8406 square miles of Upper or Barren measures; 2000

FIG. 27.—Map of Missouri Coal-field.

square miles exposed Middle measures; 12,420 square miles of exposed Lower measures. The aggregate thickness of the Upper measures is 1317 feet, but they contain only 4 feet of coal in their beds, the two largest beds being each 1 foot thick. The Middle coal-measures are 324 feet, and contain 7 feet of coal, with two workable seams, respectively 21 and 24 inches thick; one other, of 1 foot, is worked under favorable circumstances. There are six seams too thin to work. The Lower measures are from 250 to 300 feet thick, and have five workable seams of coal, varying from 1½ to 4½ feet thick. There are also thin seams varying from 6 to 11 inches thick: in all, 13 feet 6 inches of coal—total, 1900 feet of coal-measures, 24 feet 6 inches of coal. (See Table XXV.) That from the thicker seams is gen-

TABLE XXV.—*Cross-Section of the Coal-Measures of Missouri [by G. C. Broadhead].*

No.		Thickness.	Counties.
	Lower Division.		
1	Coal, clay 10 in. at base	2 ft.	Ralls, Audrain, St. Louis, and Johnson.
2	Measures	13 ft.	St. Charles, Montgomery, Henry, Johnson.
3	Coal	11 in.	Macon, Henry, and Johnson.
4	Measures	11 ft.	Macon.
5	Coal	2½–4 ft. 5 in.	Randolph, Boone, Callaway, Johnson.
6	Measures	48 ft.	Henry, Vernon, Bates, Adair, Sullivan, Putnam, Audrain, and Macon.
7	Coal	2 ft.	Henry.
8	Measures	4 ft.	
9	Coal	8 in.	Johnson.
10	Measures	18 ft.	
11	Coal	1 ft. 8 in.	Johnson.
12	Measures	18 ft.	
13	Coal	7 in.	Johnson.
14	Measures	52 ft.	
15	Coal	1½ ft.	(Warrensburg), Johnson, Henry, and Chariton.
	Middle Division.		
16	Measures	50 to 90 ft.	
17	Coal	21 in.	Lafayette, Johnson, Carroll, and Livingston.
18	Measures	14 ft.	
19	Coal	7 in.	Lafayette and Ray.
20	Measures	36 ft.	
21	Coal	2 ft.	(Lexington), Lafayette, Johnson, and Ray.
22	Measures	70 ft.	
23	Coal	1 ft.	Cass, Johnson, Lafayette, Livingston, Grundy.
24	Measures	164 ft.	
25	Coal	3 in.	Pleasant Hill, Missouri City, Princeton, Mercer co.
26	Measures	379 ft.	
	Upper Division.		
27	Coal	10 in.	Platte county.
28	Measures	207 ft.	
29	Coal	12 in.	Andrew, Buchanan, De Kalb, Gentry, Platte.
30	Measures	392 ft.	
31	Coal	12 in.	Holt, W. part of Nodaway, and northwardly.
32	Measures	339 ft.	

erally sold at ten cents per bushel. The product of a thin seam, 10 to 14 inches thick, on the Nodaway River, is sold at twenty cents per bushel. The miners, it is said, prefer to work a bed from 2 to 2½ feet thick to one of greater thickness, and consider all beds over 18 inches thick as workable coal; but if so, they differ from those of other States. The estimated area within which workable coal may be reached within 200 feet of the surface is about 7000 square miles.

TABLE XXVI.—*Analyses of Missouri Coal [by G. C. Broadhead].*

County.	Sulphur.	Water.	Volatile matter.	Carbon.	Ash.
Ray	2·41	10·05	38·55	4[illegible]	[illegible]
Pettis	4·41	5·95	38·10	[illegible]	[illegible]
St. Louis	...	9·55	38·28		9·28
Henry	...	5·14	37·91		10·13
La Fayette	...	6·36	36·28	[illegible]	9·36
Johnson	...	7·29	42·27	[illegible]	8·49
Lincoln	2·63	8·50	39·50		5·85
Carroll	...	2·97	36·26		12·01
Saline	...	6·02	40·[illegible]	4[illegible]	11·58
Livingston	...	5·38	45	[illegible]	7·27
Nodaway	...	3·58	[illegible]		13·01
Callaway	...	7·45			7·23
Andrew	...	3·94			10·13
Cass	...	[illegible]			3·23
Chariton	...	[illegible]			1·01
Macon	...	1[illegible]			3·70

ARKANSAS.—The coal [illegible] of Ar[illegible] an area of 9043 square [illegible] the [illegible] Arkansas River in the w[illegible] [illegible] [illegible] The measures lie horizontally, easy of access. Two beds of c[illegible]

FIG. 28.—Map of Arkansas Coal-field.

lower is of workable thickness. The best coal in Arkansas is the Spadra coal, in Johnson ... a semi-anthracite, which in some places is 3½ ...ick. The seams of coal on both sides of the ... are from 10 inches to 1 foot in thickness. In ... county the coal is 4½ feet thick, with two ... of 1 inch each: 1 foot of the top coal is ... the southern part of Franklin and Johnson ... the coal is 2 feet thick. The accompanying ... (Macfarlane, p. 499) show the character of the

	Water.	Volatile matter.	Fixed carbon.	Ash.
...co.....	1·40	12·35	82·25	4·00
.....	3·80	10·70	84·10	1·40
.....	3·00	11·40	80·40	5·20
...co. (11 in.).....	2·00	7·75	88·75	1·50
...d co. (1 ft.).....	1·00	15·20	80·80	3·00
Creek.....	0·50	7·90	85·60	6·00

"These analyses," Dr. Owen says, "prove the coal to ... bituminous, like some of the coal in George's ... Valley, Md.; but, in fact, these coals contain ... carbon, and are anthracite or semi-anthracite. ... far richer in fixed carbon than most of the coals ... Western States, they are therefore almost twice as ...le in the fire, with proper access of air. The ex... of a semi-anthracite or semi-bituminous coal in ... is the more surprising as the formation is level ... rbed, bearing but little evidence of meta... ...r change by internal heat. There is, how... ...er, ... of undoubted igneous origin 60 miles south ... Johnson county, in Hot Springs county. The igne... ...re no doubt near enough to the surface to ... ...ated an igneous action, and to have expelled ... ...ter portion of the gaseous matter. The pecu... ...ed ...ucture of the Spadra coal favors the idea ... ... t was expelled not only by pro... ...chemical ... ..., but by heat, which causes an ... of ... ...ticles, and that severing the coal ... ...ency and a peculiar subdivision ...

...—The ... treeless prairies of Nebraska ... ... peculiarly valuable, but ... western rim of the Mis... ... rest is in beds too thin to ... bearing area of the State is a triangular section in the south-west corner. Several

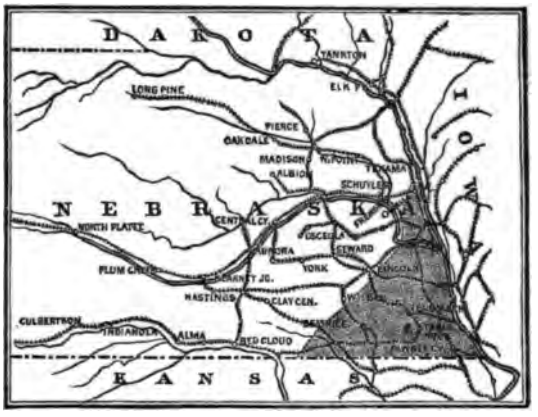


FIG. 29.—Map of Nebraska Coal-field.

beds are found in this, but the coal, though sometimes of good quality, is only from 5 to 22 inches in thickness, and will not pay for mining. Prof. Hayden, after an exhaustive examination of the field, declares that the rocks of the Nebraska coal-field belong to the Upper Barren measures and contain no workable beds. In favorable locations the thin seams are mined for local use, but are scarcely able to supply even this demand.

FIG. 30.—Map of Kansas Coal-field.

KANSAS.—The coal-fields of this State are a continuation of the measures of Iowa and Missouri. They occupy the whole of the eastern portion of the State, bounded on the west by an irregular north-west and south-westerly line through Marshall, Lynn, Wilson, and Montgomery counties, and covering an area of 17,000 square miles. The coal-measures are nearly horizontal, with a slight dip to the north-west. No faults are found in the beds. The upper portion of the measures contains only traces of coal. Most of the coal crops out in Upper Kansas, and is not very thick, but furnishes a supply for domestic uses. The coal is not pure, owing to its being so near the top of the measures. The seams are thin in the northern portion of the State; in the lower portion there are two beds of uniform quality and thickness. The first, the Osage seam, found in Linn and Bourbon counties, is 2 feet thick; and the second, or Cherokee, the most important bed in the State, crops out in the centre of Cherokee county, extending thence into the Indian Territory. It is 6 feet thick on the average, and of good quality. These beds are the productive ones of the State. The coal

is 300 feet below the surface. At Leavenworth, and in that portion of the State, shafts have been sunk 710 feet before finding coal. The Kansas coal is a good bituminous, does not crumble, and differs from most Western coals in being remarkably free from sulphur.

In *Western Kansas* there are thick beds of brown coal. The beds crop out west of Salina, in Saline county. They are from 3 to 7 feet thick.

Prof. Swallow, State geologist, gives the following summary section of the coal-measures of Kansas:

1.	Lower Carboniferous formation	120 feet.
2.	Lower coal series, contains 24 layers, 5 beds of coal—(1) 6 to 10 in., (2) 3 ft., (3) 2 to 4 in., (4) 2 to 6 in., (5) 5 to 7 in	353 "
3.	Fort Scott marble series, 7 layers—coal-bed 2 ft. 6 in.	23 "
4.	Fort Scott series, 12 layers, 2 coal-seams—6 ft. and 16 in	142 "
5.	Pawnee limestone series, 9 layers—6 in. coal	112 "
6.	Marais des Cygnes series, 25 layers, 4 seams of coal—(1) 2 to 3 ft., (2) 1 ft. to 2 ft. 6 in., (3) 1 ft. 8 in. to 2 ft. 9 in., (4) 2 in	303 "
7.	Well Rock series, 11 layers—coal 1 to 5 in	238 "
8.	Spring Rock series, 9 layers, 2 seams of coal—6 in. to 1 ft. and 4 to 8 in	88 "
9.	Cave Rock series	75 "
10.	Stanton limestone series, 5 layers—coal 12 to 30 in	74 "
11.	Chocolate limestone, 10 layers	79 "
12.	Upper coal-measures, 56 layers, 3 seams of coal —1 to 3 in. and 4 to 10 in	391 "

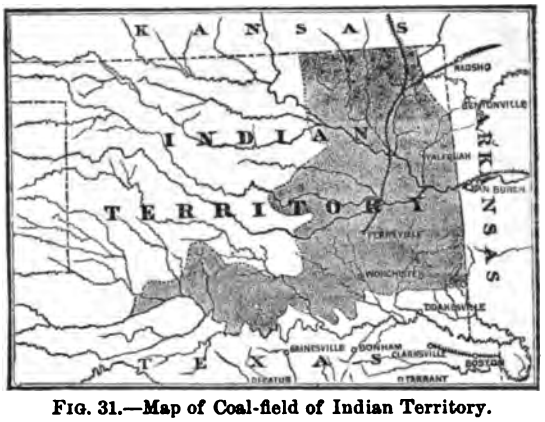


FIG. 31.—Map of Coal-field of Indian Territory.

INDIAN TERRITORY.—Indian Territory has 13,600 square miles of coal-measures, with some good coal, but its character and other details have not been ascertained. At McAllister is an extensive bed of valuable bituminous coal. Within three miles of that place a plot of at least 1000 acres is worked by the Osage Mining Company, a Kansas corporation, and produces eighty cars of coal a day, all of which is sold to the Missouri, Kansas, and Texas Railroad, or shipped *via* the Missouri, Kansas, and Texas Railroad to Texas. It is a very superior gas coal. The vein is also worked at Savannah, ten miles south, and again crops out at Atoka, forty-five miles south, on the Missouri, Kansas, and Texas Railroad, and is known to stretch far to the east. The Choctaw Nation leases to the Osage company.

It will have been noticed that the coal-field of Kansas evidently extends over the north line, and that of Arkansas over the east line, of the Territory occupied by the Indian tribes who were removed west of the Mississippi River. The coal-field of Texas also approaches the south line of that Territory. All these facts indicate the existence of important fields of coal

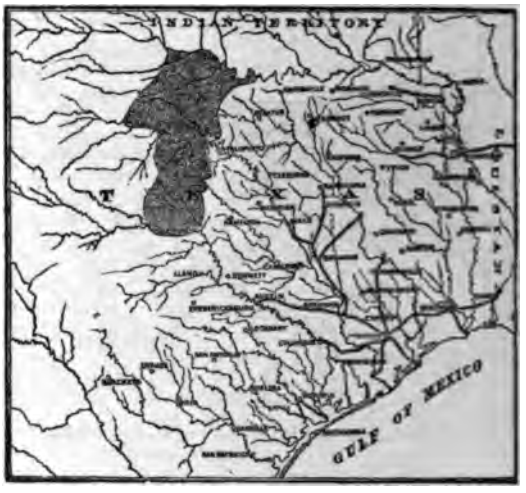


FIG. 32.—Map of Texas Coal-field.

TEXAS.—An outspur of the great Missouri coal-field covers the north-eastern portion of the State of Texas for about 6000 square miles. This coal is a regular bituminous. The formation belongs to the Carboniferous age. It extends into Stephens and Young counties, where explorations have shown the presence of two beds, about 40 feet apart. Some beds are 3 feet in thickness, and others vary from 4 to 6 feet. The strata lie nearly horizontal and cover a very large area. The quality of the coal is not very good, being high in ash and full of sulphur. This coal-field extends south to the Colorado River. An analysis of this coal is added:

Analysis of Coal, Young co., Texas.

Moisture	10·00
Volatile combustible matter	30·75
Fixed carbon	46·50
Ash	11·96
Sulphur	·79
	100·00

Lignites occupy large areas in Texas. One bed runs south-west through the State, commencing at the Sabine River, 20 miles below the 32d parallel of north latitude and extending to the Rio Grande River. Another bed of lignite runs parallel to this through Cass county and on through Cherokee county. There is a small field of coal in Brown, Coleman, Comanche, and Hamilton counties. This is said to be a semi-anthracite. Good cannel coal is reported to be found in Webb county. It belongs to the Tertiary formation, and makes a good gas coal.

LIGNITES AND LIGNITIC COAL.

The lignitic coals of the western portion of the United States are destined to play an important part in the industrial development of that portion of the American continent, as they are, with [illegible] the only form of mineral fuel to be [illegible] 100th meridian. Lignite is the peat in the formation of coal, and [illegible] both appearance and chemical composition varies from light yellow to deep black. Some writers restrict the term "lignite"

a distinct woody structure, and make a separate variety of the more compact and higher grade between this and bituminous, which they call "brown" coal. The distinction is more apparent in Europe than in America, as in this country the gradations are so minute as to make it almost impossible to say where the lignites end and the brown coals begin.

As might be supposed from their intermediary position between peat and true coals, lignites belong to a later geological period than the Carboniferous. They occur principally in Cretaceous and Tertiary formations, but the beds, which often are of great thickness, present the same general characteristics as those of the true coals. Like them, each bed is underlaid by a seam of fire-clay, the soil in which the plants grew, and overlaid with shales and sandstones; and, like them, they are regularly interstratified with the surrounding rocks. Many instances occur, too, in which local causes have changed portions of lignite beds to bituminous, and even to anthracite, the coal in each case being simply a higher development of the lignite; showing that they are essentially the same substance.

Lignites of the Eastern Hemisphere.

LIGNITES have been used in Europe for many years, though their inferior qualities as heat-producers make them less popular than the true coals. They are found in England, France, Germany, Spain, Switzerland, Greece, Scandinavia, Russia, Austria, and perhaps other European countries, as well as in the island of Madeira, in Greenland, Iceland, Asia Minor, Persia, Siberia, Thibet, India, Australia, Tasmania, and indeed in most parts of the globe. In many places where the geological formation makes the presence of lignites probable they have not yet been sought for, and in many other places they have been found, but not worked. Some varieties emit a disagreeable smell when burning; some, like the "Cologne earth" of Germany, crumble to powder when dried, and are used as pigments. The following are analyses of *European* and *Australian* lignites:

	Carbon.	Hydrogen.	Oxygen and nitrogen.
Bovey, Devon	67·9	5·8	26·3
Cologne	67·0	5·3	27·7
Tasmania	71·9	5·6	22·5
Auckland	72·2	5·4	22·4
Hungary (slightly fibrous)	72·5	5·4	22·1
" (more fibrous)	74·9	5·2	19·9

Prof. Thorpe (*Coal*, p. 176) gives the following table of averages, showing the progressive changes in chemical composition relatively to a constant amount of carbon:

	Weight of 1 solid cubic foot in lbs.	Carbon.	Hydrogen.	Oxygen and nitrogen.
Wood	30	100	12·3	86·8
Peat	70	100	9·7	54·7
Lignite	70	100	8·3	40·0
Brown coal	75	100	7·4	29·7
Bituminous coal	80	100	6·4	13·4
Anthracite "	90	100	2·6	2·3

The figures in the column showing the approximate weight of a cubic foot of the several substances are instructive as indicating the joint effect of compression and of the gradual destruction of cellular structure in increasing the density of the product.

American Lignitic Coal.

The lignites of Western America resemble the "brown coals" of Europe in holding a large amount of water, the proportion of this ingredient in most of them being from 12 to 15 per cent., though some have as low as 4 and others as high as 20 per cent. They do not show a woody or fibrous structure, but are compact and generally black, with a very high lustre, resembling in appearance some of the bituminous coals; with which, indeed, they are, for practical purposes, almost identical. Only the geologist can distinguish between the best lignites and bituminous coal. The percentage of ash is low for lignites, varying from 2 to 6 per cent., while the sulphur seldom reaches 1 per cent. The volatile products driven off at a dull red heat vary from 25 to

TABLE XXVII.—*Proximate Analyses of Western Lignitic Coals.*

	Water.	Volatile matter.	Fixed carbon.	Ash.	Units of heat in 1 lb. of coal.	Specific gravity.	Color of ash.
Vermejo Cañon, New Mexico	3·27	23·73	59·72	13·28	5418	1·36	Brownish gray.
Cañon City, Col	5·40	36·40	54·70	3·50	...	1·29	Yellow.
Colorado Springs, Col	12·90	39·10	46·00	2·00	...	1·27	Fawn.
Golden City, Col	13·67	34·75	47·58	4·00	...	1·35	
Murphy, Ralston, Col	11·70	29·07	55·31	3·92	4870	1·39	Ochre yellow.
Erie Mine, Col	14·80	34·50	47·30	3·40	...	1·27	Orange.
Carbon, Wy. Ter	11·60	27·68	51·67	6·17	...	1·37	Light gray.
Hallville, Wy. Ter	12·12	29·75	54·37	3·76	...	1·32	Gray.
Point of Rocks, Wy. Ter	8·54	30·60	52·34	8·52	5181	...	White.
Van Dyk's, Wy. Ter	8·12	36·65	53·23	2·00	...	1·27	Light gray.
Rock Springs, Wy. Ter	6·25	31·75	53·45	9·55	...	1·23	White.
Evanston, Wy. Ter	8·07	43·06	47·34	9·60	5632	1·34	Gray.
Coalville, Utah	10·66	38·23	48·00	3·11	...	1·32	
Wasatch, Utah	8·38	47·06	49·68	2·26	6154	1·31	Nearly white.
Weber River, Utah	9·45	26·21	58·32	3·64			
Mount Diablo, Cal	14·69	33·89	46·84	4·68			
Coos Bay, Oregon	20·09	32·59	41·98	5·34			
Bellingham Bay, Wash. Ter	8·39	33·26	45·69	12·66			
Nanaimo, Vancouver's Island	2·98	33·16	46·31	18·55			
Bozeman, Montana	7·00	34·50	50·50	8.00			

These analyses give the true value of coal as a heat-producer. The "volatile matter" in proximate analyses ... some combined water that tends to diminish the heat. The nitrogen also is an impurity. The following ... from Prof. Rossiter W. Raymond:

	Uncombined water.	Carbon. Probably fixed.	Carbon. Probably combined with hydrogen.	Hydrogen. Probably combined with carbon.	Hydrogen. Combined with oxygen to form water.	Oxygen.	Nitrogen.	Ash.	Sulphur.	Combined water.	Calorific power.
Cañon City, Col.....	5·18	50·36	17·22	5·74	1·68	13·42	...	5·77	0·63	15·10	7330
Carbon Sta., Wy. Ter...	11·56	59·41	5·58	1·86	1·90	15·20	1·74	1·68	1·07	17·10	5738
Carbon Sta., Wy. Ter...	8·06	59·63	9·51	3·17	1·19	9·54	1·25	6·62	1·03	10·73	6578
Weber Cañon, Utah.....	9·41	57·64	7·20	2·40	1·94	15·52	1·29	3·00	1·60	17·46	5912
Echo Cañon, Utah.....	9·17	62·25	7·59	2·53	1·37	10·99	1·93	3·40	0·77	12·36	6400
Coos Bay, Oregon.....	13·28	54·29	1·95	0·65	2·73	21·82	0·42	4·05	0·81	24·55	4567
Mt. Diablo, Cal.....	8·94	50·36	9·36	3·12	1·96	15·69	1·01	5·64	3·92	17·65	5757

37 per cent., and the amount of fixed carbon is from 45 to 60 per cent. They are superior to European lignites, but differ from the true coals, and hence are termed "lignitic coal." *Hayden's Report of the U. S. Geological Survey of Colorado for 1873* gives tables of all reliable proximate analyses of these lignitic coals, and the preceding table is abstracted from them. (See Table XXVII.)

As the heat-producing power of the coal is dependent on a chemical union of the atmospheric oxygen with the carbon and hydrogen in the coal, thus forming carbonic acid and water, the amounts of these products represent the amount of heat which has been produced as the result of their formation; while the ash and moisture present diminish the percentage of combustible ingredients and the heat-producing power of the whole, the moisture being a further disadvantage, as it requires a considerable amount of heat to expel it.

These coals are found in a series of sandstone and fire-clay, probably of Lower Tertiary age. The fossils contained are chiefly leaves of deciduous trees. No ferns or fossil plants, like those common to the true coal-measures, are found in this formation. The coal-beds are often of great size, reaching a thickness of 27 feet on Bear River, Utah. They are remarkably free from impurities and without slate partings. Iron pyrites may be detected in small flakes and thin disks. All the coals tend to crumble after having been exposed to the weather, and this tendency to crumble is the cause of great waste at the mines. With rare exceptions, when submitted to the coking process they retain their form or crumble into a dry powder. As a fuel for locomotives and for domestic purposes the coal answers well. It kindles and burns freely, making a bright fire, with a yellow blaze and comparatively little smoke. The presence of iron pyrites in coals so easy to crumble as these, suggests the possibility of spontaneous combustion.

Wyoming Lignitic Coal.—The largest single deposit of coal yet discovered on the American continent is the Twin Creek coal in the Green River coal-basin, in Southwestern Wyoming, where the writer's explorations show 250 feet of coal in a thickness of about 3000 feet of measures. (See fig. 33.) The number of beds is not known, but twenty-two of workable thickness have been developed, and there are traces of nearly or quite as many more, most of which are supposed to be workable. On the line of the Utah and Wyoming Railroad, about 100 miles east of Corinne and 20 west of Ogden, two series of coal-deposits have been traced, which Dr. Hayden and Clarence King ascribe to the Cretaceous period—a notable exception to Dr. Hayden's theory that the Rocky Mountain lignites belong to the Tertiary formation. The first is in the Lower Fox Hill group, and the second in the Laramie group. South of where Ham's Fork of Green River cuts through Oyster Ridge two beds of coal have been opened; the upper is 10 feet thick, and contains 18 inches of fire-clay, 6 of hard sandstone, 72 of coal, 6 of soft fire-clay, and 18 of coal; or 7 feet 8 inches of coal in a 10-foot bed. The second bed is about 40 feet below this, and consists of 10 feet of coal, 6 inches of sandy clay, 1 foot 8 inches of dark slate and fire-clay, and 1 foot 8 inches of coal. The strike of these beds is nearly due north, and they dip westwardly 23 degrees. They are regular, and have been traced for several miles (fig. 34).

A second series of beds appears in Coal Ridge, a hill parallel to Oyster Ridge and about 4 miles west of it. They first appear through the overlying Tertiary deposit 6 or 8 miles south of Bell's Pass, and rise gradually to about 300 feet above the valley of the north branch of the Little Muddy River. Observations taken at thirty-four shaftings located about 3 miles south of Bell's Pass show that the coal-beds underlie strata of fire-clay or sandstone, or both, varying in thickness from 3 to 100 feet, and averaging about 37 feet through the series. The beds themselves vary from 3 to 40 feet, averaging 11 feet throughout the series. The coal generally is of good quality, and but four or five of the whole series of beds must be regarded as certain to prove unprofitable in working, although in several instances coal has been reached without a thorough proof of the thickness of the deposit. In four shaftings the superincumbent strata are 300 feet in depth; in one, 200 feet.

Several other beds, overlying the last of this series, were seen in other parts of this field, but not developed. The distances between the beds in the above section (see fig. 33) were estimated or taken from barometrical measurements, and are only approximate, as indeed the whole statement necessarily must be. It gives, however, an idea of the richness of this magnificent field. The beds have been traced for a distance of at least 10 miles in a north-and-south direction.

The following are results of analyses of coals from Twin Creek. They are numbered according to their place in the series mentioned above:

	No. 1.	No. 2.	
Moisture	17·305	13·682	
Volatile matter	36·177	38·807	
Fixed carbon	44·147	42·712	
Ash	2·371	4	
	100·000	100	
Color of ash	White.	y.	Yellow.
	No. 18, Mouzilly.	21.	
Moisture	14·710		
Volatile matter	35·410		
Fixed carbon	48·094		
Ash	1·785		
	100·000		
Color of ash	Yellow.		

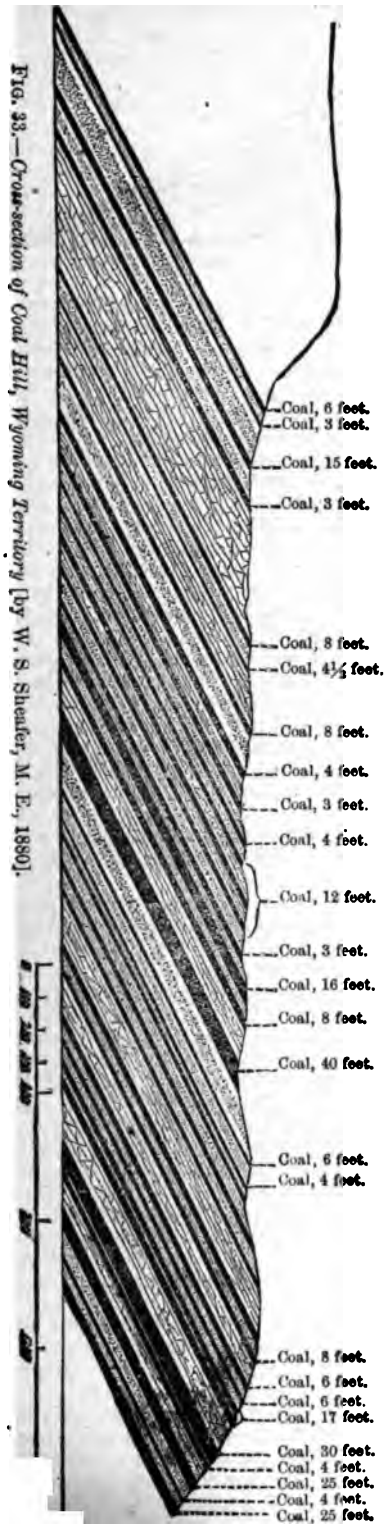


FIG. 33.—*Cross-section of Coal Hill, Wyoming Territory* [by W. S. Sheafer, M. E., 1880].

TABLE XXVIII.—*Analyses of Lignitic Coals in Wyoming and Montana.*

	I.	II.	III.	IV.	V.
Moisture	17·31	13·88	14·71	4·72	7·00
Volatile matter	36·18	38·81	35·41	39·49	34·50
Fixed carbon	44·15	42·71	48·09	50·80	50·50
Ash	2·37	4·60	1·79	4·99	8·00
Color of ash	White.	Gray.	Yellow.		

No. I. No. 1 vein, Twin Creek, Wyoming.
" II. No. 3 " " " "
" III. No. 18 " " " "
" IV. Ham's Fork, Wyoming.
" V. Bozeman, Montana.

COLORADO LIGNITIC COAL.—At Golden City, 15 miles west from Denver, coal was first discovered in several small and vertical beds near together in the steep bank of Clear Creek, a half mile below where it passes out from the mountain. An extension of one of the beds toward the south was opened at the summit of the ridge. The bed was 10 to 14 feet thick, but irregular, sometimes pinching to a few inches, and then expanding to 8 or 10 feet. The average thickness is 5 feet. Two large coal-beds are opened at Ralston Creek, 5 miles north of Golden City. They lie in a vertical position, 25 feet apart. The upper or western bed has 9 feet of good coal, and the lower bed 14 feet. Marshall's mines are in the valley of South Boulder Creek, 22 miles from Denver. There are four coal-beds. The coal is brilliant.

Lignitic coal has been found on both the east and west sides of the Platte River, but the only mines of importance are near the eastern foot of the Blue Hill range of mountains. The formation is a series of sandstones, ranging north and south, and along its western margin is upilted in a vertical position, sometimes dipping toward the metamorphic rocks that make up the steep mountain-slope. Away from the mountains the inclination is eastward and very gentle. The formation follows the mountain-range for an unlimited extent.

In Hayden's *Report* will be found sections showing the series of beds at these mines.

These coals analyze as follows (two samples):

Water, in a state of combination, or its elements, as in dry wood	12·00	20·00
Volatile matter, expelled at red heat, forming inflammable gases and vapors	26·00	19·30
Fixed carbon	59·20	58·70
Ash, consisting chiefly of oxide of iron, alumina, and a little silica	2·80	2·00
	100·00	100·00

Other openings in Colorado are the Wilson, Brigg, and Baker mines on Coal Creek. The coal-belt extends north into Wyoming Territory, but is not found east of the Black Hills. At Carbon, on the Union Pacific Railroad, in the Laramie Valley, 140 miles west of Cheyenne, the bed is 7 feet thick. (See Table XXIX.) The coal is good, but has much impurity. At Hallville, 142 miles farther west, are several coal-beds. The main bed is about 6 feet thick. The next coal-mine is at Van Dyke, 30 miles west. The coal here is 4½ feet thick, and remarkably clean. This and the next coal, at Rock Springs, have the best reputation among Rocky Mountain lignitic coals. The latter mines are 2 miles west of Van Dyke; the bed is 9 feet thick. At Evanston, 126 miles west of Rock Springs, the beds are 26 feet thick, and dip 15°. Iron pyrites are abundant; the coal clinkers to a great extent. These mines supply the Union Pacific and Central Pacific Railroads with fuel. At Coalville, in Utah, these beds are still found. (See Table XXVII. for analyses.)

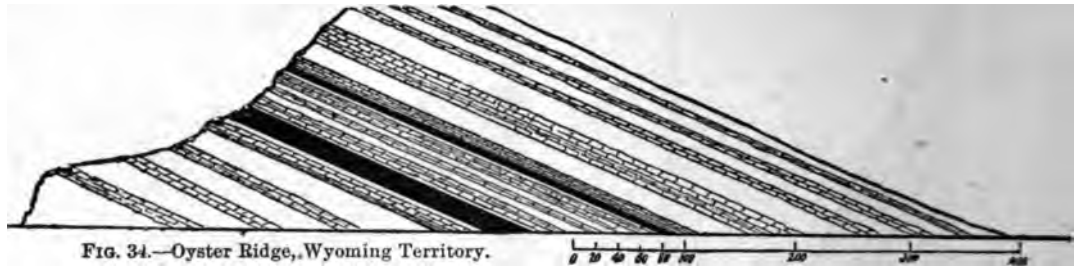


FIG. 34.—Oyster Ridge, Wyoming Territory.

TABLE XXIX.—*The Coal-mines of the Union Pacific Railroad.*

According to Poor's *Manual* the coal-lands owned by the Union Pacific Railroad Company extend along the line of the road from Carbon to Echo, a distance of 335 miles, and embrace an area greater than the entire anthracite region of Pennsylvania. Previous to 1875 the mines were worked by contractors, but since that time the company has operated them on its own account. The results of working the principal localities for the last six years are shown in the following table:

Year.	Carbon.		Rock Springs.		Almy.		Total.	
	Tons Mined.	Cost per Ton.	Tons Mined.	Cost per Ton.	Tons Mined.	Cost per Ton.	Tons Mined.	Cost per Ton.
1875	61,750	$2.05	104,667	$1.84	41,805	$1.73	208,222	$1.88
1876	69,062	1.59	134,953	1.37½	60,756	1.32½	264,771	1.41½
1877	74,243	1.24½	146,494	1.10½	54,643	1.05	275,480	1.13½
1878	62,418	1.20	154,281	0.99	59,096	1.00½	275,795	1.04½
1879	75,325	1.19	193,251	0.98½	71,576	1.16½	340,152	1.06½
1880	100,434	1.35½	244,460	1.24½	100,235	1.07½	445,129	1.23
Total production	443,332	....	978,106	....	388,111	....	1,809,549	
Av. cost per ton.	....	$1.42	....	$1.25½	....	$1.22½	....	$1.29½

At Cañon City, Col., there is an independent coal field. The coal-openings are 6 miles below the town, on the Arkansas River. The strata lie, for the most part, in a horizontal position, except along the north and west sides. Here the pitch is steep, but flattens and forms a basin, the centre being 3 miles east of the base of Greenhorn Range, a spur of the Rocky Mountains. The basin is 10 miles long and 5 miles wide, containing in all 34 sq. miles of coal-bearing rocks. There are at least nine seams of lignitic coal, varying in thickness from 6 inches to 8 feet. The two seams cropping farthest south are 6 and 7 feet thick, and but 50 feet apart. The lowest seam is the Cañon City coal, 51 inches thick, 'black, compact, uniform in color, separating in large cubical blocks.' Towards the north these seams grow thinner and are farther apart.

Lignitic coal is found and mined in the vicinity of Trinidad, Las Animas county. The coal-seam is 9 to 10 feet thick, and its product looks like bituminous coal. It yields an excellent coke, and at present is used extensively in the iron-works of Colorado.

At the town of Walsenberg, Huerfano county, 50 miles south of Pueblo, there is a seam 8½ feet thick, the coal being of a dull lustre, resembling splint coal, and approaching, to a certain degree, the qualities of the Trinidad coal.

TABLE XXX.—*Lignites of Southern Colorado and New Mexico.*

	I.	II.	III.	IV.	V.	VI.	VII.
Moisture	7·665	8·650	1·150	1·540	14·5	3·27	2·90
Volatile matter	37·210	35·447	30·200	6·350		23·73	3·18
Fixed carbon	49·535	49·403	58·040	74·850	61·0	59·72	88·91
Ash	5·590	11·580	10·610	17·260	24·5	13·28	5·21
Sulphur	0·819	0·651	0·595	0·655			

No. I. Cañon City., Col., lower seam.
" II. Walsenberg, Col.
" III. Trinidad, Col., coal.
" IV. Trinidad, Col., coke.
" V. Arizona, Deer Creek.
" VI. Vermejo Pass, New Mexico.
" VII. Placer Anthracite, New Mexico.

Large and valuable beds of *bituminous* lignite are found on the Animas River, forty miles south of Silverton, in the vicinity of Durango, where, as a consequence, extensive machine-shops, smelters, and coke-ovens have been established.

A recent writer (April, 1882) says of the Colorado coals: "The mines in the north, in Boulder and Jefferson counties, became known soon after the development of the State began, and these still supply a considerable portion of the coal used. But as development continued the fact became manifest that the better portion of the coal-deposit was in the southern half of the State. Cañon City coal, for instance, commands several dollars a ton more in Denver than any other soft coal mined in Colorado—a pre-eminence that it will hold only relatively now that the exceptionally fine, free-burning bituminous [lignitic] of the Gunnison is fairly brought into the market by the opening of the Gunnison extension of the Denver and Rio Grande Railway. In the extreme south, too, close upon the New Mexican line, is found the famous coking coal of El Moro, which, again, is excelled by the coking coal of Crested Butte; and the Cucharas mines, also in the south, yield a good quality of bituminous. From these several mines the output last year amounted to 350,000 tons, and the estimated output of the present year is 400,000 tons."

The report of the Colorado Coal and Iron Company for 1881 shows the following beds worked by it: In the Cañon coal-field two beds are worked, 4 and 5 feet; the product was 125,902 tons; its value at mines was $258,417. In the Cucharas coal-field three beds are worked, 4, 7, and 6 feet; the product was 71,272 tons; its value was $135,624. In the El Moro coal-field there was worked a horizontal bed, 10 to 12 feet thick, of good gas, blacksmith, coking, and domestic coal; the product was 150,585 tons; its value was $146,941. In the Crested Butte coal-field were worked four seams, 4, 5, 6, and 10 feet thick; the 5-feet and 4-feet beds produce good coke. A railroad has recently reached this field. The estimated production in 1882 is 70,000 tons. The company's present plant consists of 250 beehive coke-ovens. In 1881 they sold 47,186 tons of El Moro coke for $247,300, making a net profit of $2.31 per ton. Two steam crushing and washing establishments are used to prepare the coal for coking.

NEW MEXICO.—New Mexico contains [illegible] in all their grades of anthracite, bituminous [illegible] lignites. The anthracite, so far as known, [illegible] only in the Placer Mountains, on the [illegible] of the Rio Grande Valley, 30 or 40 miles [illegible] Santa Fé; the bituminous, at various points [illegible] in the Cretaceous plains, where, by [illegible] have been cut through to the coal-measures; pure lignites in the Tertiary beds of [illegible] of the Territory. The outcrops [illegible] north-west side of the Placer

interest. They were first exposed in the centre of the little branches that run into the Gallisteo Creek. The coal is in the natural condition. The following section of the strata was taken, ascending: (1) Laminated clay, with thin seams of sand, passing up into carbonaceous clay as a floor for the coal. (2) Coal, very compact. The cleavage lines are, in a few instances, filled with clay, 5 to 6 feet. (3) Drab clay, indurated, 15 to 20 feet. (4) Ferruginous sandstone, passing up into light grayish sandstone, 30 to 50 feet. At another locality there is a bed of coal which has been changed into anthracite by an enormous dyke.

A cross-section shows—(1) clay slate; (2) 2½ to 3 feet of anthracite; (3) 14 to 18 inches of clay; (4) 14 inches to 2 feet of anthracite; (5) clay shale, passing up into alternate layers of sandstone and clay, 10 feet; (6) dark sandstone.

The dip of all the beds is 14° east. They are overlaid by a thick bed of columnar basalt. The dyke that covers the coal-bed trends about north and south, or a little east of south.

Three groups of Tertiary beds, of different ages, have been traced in the valley of the Rio Grande. They are —(1) The coal-strata, with abundant impressions of deciduous leaves, lying above well-marked Cretaceous beds. (2) The Gallisteo sand group, which plainly overlies the coal-strata, but inclines equally with and conforms to them. (3) The Santa Fé marls, which are of much later date than either of the other two, and rest conformably upon the Gallisteo group, and never incline more than 9° or 10°.

In the Raton Mountains, in New Mexico, the coal approaches anthracite in quality, although somewhat impure and high in ash. Dr. Leconte reports the bed as having a thickness of 4 feet. At Vermejo Cañon there are two beds of poor coal, 10 and 15 feet, and two beds of 5 feet. In Raton Pass are found several beds from 3 to 8 feet thick. In Blackmore Cañon and Bremer Cañon the bed is seen, but the thickness varies. Twenty-eight miles south-west of Albuquerque lignite beds, 5 feet thick, are exposed. At Cimarron the bed is reported to be 14 feet thick. The coals in this region are used in the various railroads now traversing this section of the country.

The following summary of the coal discoveries in New Mexico was made by John Robertson, M. E.

"As you enter the Territory of New Mexico from the north by way of the Atchison, Topeka, and Santa Fé Railroad, the first point where coal is found is at and in the neighborhood of Raton. Here large bodies of coal of a bituminous character are opening out, and the town of Raton has become the centre of the coal interests of the northern part of the Territory. The railroad company is the principal owner, and it has commenced a vigorous development of its property, both for its own use and for public consumption; and the existence of coal at this point has led it to establish large machine-shops, etc., for its business. Coming south, we reach Las Vegas, where vigorous explorations are now carried on, which so far have developed the existence of bituminous coal-seams of from 12 to 24 inches, which underlie nearly the whole district Boring is still pushed forward, and hopes are entertained of iking a coal of sufficient thickness to pay for ing. venty miles farther south coal is found in forming the Pecos range. These seams explored beyond the point of proving their thickness, which runs from 30 to 36 inches. Twenty miles farther south there are the extensive coal-fields of Los Cerillos, many thousand acres in extent, and consisting of both bituminous and anthracite. The anthracite veins vary from 18 to 40 inches; the bituminous average about 3 feet. Still proceeding south to Albuquerque, and then taking the line of the Atlantic and Pacific Railroad, inexhaustible fields of the finest cannel and bituminous coals have been discovered. One vein is 5 feet 6 inches in thickness of cannel coal, of which there are over 1000 acres in one body only 2 miles from the road. Continuing down the main line, we reach San Antonio, in Socorro county, where at San Pedro, 7 miles east, there are several hundred acres of bituminous coal of good quality. This field is owned and operated by the railroad company. At various other points in the Territory similar beds have been discovered, which, from their distance from existing railroads, are not at present considered valuable.

"All the points above mentioned are from one to seven miles from railroads, and are destined to prove of value. Coking establishments are building or projected at several of these points; and as we have extensive mines of gold, silver, copper, lead, and iron, a bright future seems to be before this Territory. With few exceptions, the coal-fields are on Government land."

Arizona.—The great lignitic fields of the West seem to continue into the south-eastern corner of Arizona, but the discoveries here are quite recent, and have not been proved to a very great extent. Coal has been found in the Saddle Mountains, 6 miles east of the San Pedro River and 4 miles south of the Gila, on the line of 33° north latitude. There is quite a number of beds, which lie almost flat, few appearing on the surface. At Casa Granda, 25 miles south of the Southern Pacific Railroad, outcroppings of coal are numerous.

The Deer Creek coal-fields occupy the eastern half of an elliptical basin 30 miles long by 3 to 5 miles broad, lying nearly east and west, and divided centrally by the Gila River. The location is an abrupt synclinal valley, the rocks being eruptive and forming some characteristic dykes. The first discovery of coal was near the head of Deer Creek, where the valley is intersected by two dykes. The dip of the beds is 35° south. The main bed is 6 to 8 feet thick, and there are several smaller ones. The coal seems to be a semi-bituminous. The analysis is given below (No. I.). Eight miles below this is another outcrop; the dip is 35° north, and the coal a typical lignite (No. II.). The area of the whole region is about 30 square miles, in which an unknown portion of the coal-fields and beds has been broken up by the action of eruptive rocks. Where least disturbed the coal is a true lignite, but portions are changed to bituminous coal, coking well, and even to anthracite.

	No. I.	No. II.
Volatile combustible matter and water.....	14·5	47·6
Fixed carbon	61·0	44·0
Ash.....	24·5	8·4
	100·0	100·0

Utah.—The Green River coal-basin extends into Utah, west of the Wahsatch Mountains, to the Sierra Nevada range, including the plains of the Great Salt Lake. The coal-series is first seen in East Cañon Creek, a tributary of the Weber, and then continues along the Weber. The formations of the region are in three broad folds, having their rise at the base of the Wahsatch Mountains, and are parallel with a course of N. 26° E. The

middle fold contains most of the coal. Coalville is in this basin. Clarence King in his report (*Geological Exploration of the 40th Parallel*) says: "Our knowledge of the formation is now so well advanced that it can be said with perfect safety that the series contains a practically inexhaustible supply of coal. Beds from 7 to 25 feet in thickness are discovered at intervals over 500 miles, and from their ordinarily gentle dips may be mined with unusual ease. The principal mines are at Coalville. Chalk Creek, which enters the Weber River at this place, exposes the coal for 18 miles, and along its tributaries are the coal-mines. The bed has an average width of 11 to 14 feet at the Sprague mine. The coal itself is of a black, brilliant surface, with the same tendency to rectangular cleavage which is characteristic of all the Western lignites." (See Table XXVII. for analyses.)

NEVADA.—Near Pancake Mountain, 20 miles east of Eureka, in Nevada, a bed of coal from 5 to 6 feet thick has been opened. It runs north and south, and dips 40° west. The coal is much broken and displaced, and in some places seems to have been burned to ashes. It has been found to coke well and to make gas, but is used chiefly for local consumption.

CALIFORNIA.—The Mount Diablo coal-field is the only one in California that can be profitably mined. The measures are considerably disturbed, the dips varying from 12° to 33°. The coal-beds of this field are subject to great variation in thickness, the Clarke bed ranging from 20 inches to 4½ feet; the Little bed, 1 foot thick; the Black Diamond, from 6 to 20 feet thick. These beds lie parallel, with their measures dipping to the north. The coal is of rather inferior quality, lying close to the surface and requiring considerable timbering in mining—notably so in the Black Diamond bed. Fire-damp is met with in all the mines. In the preparation of the coal no machinery is needed for fracturing it, the coal being brittle in its nature and needing but slight force to reduce it to the sizes required. The yield is about 25 per cent. of the amount in the ground. Coal has also been found at Coral Hollow. The northern portion of Los Angeles county, 13 miles east of Anaheim, furnishes ten or twelve impure seams. In the western part of Fresno county the coal-measures dip from 80° to 85°. Beds of good coal 14 to 15 feet thick, overlaid by shales, have been found in Mendocino county. The rocks here are greatly disturbed, the locality being in the heart of the Coast Range, where mining would be very expensive. Shasta county has a coal-bearing strata, while in Amador county there are coals from 6 to 15 feet in thickness, all lignitic in their nature. In Placer and Solano counties the coals are small, poor, and irregular.

OREGON.—The Coos Bay coal-field in Oregon, lying 100 miles north of California and 40 miles north of Cape Blanco, consists of several hundred square miles of territory, extending from the mouth of the Umpqua River on the north to points beyond the Coquille River on the south, and stretching back from the coast 15 or 20 miles inland. The surface is generally hilly, divided by narrow and crooked inlets, each of which has a bar in front of it, with channels constantly varying. The depth of water in these channels varies from 9 to 14 feet according to the seasons, making it very difficult for large vessels to enter. The sea is very rough in winter, and ships experience hard work in entering and leaving Coos Bay. The profitable coal-mines are all in township 26 south, range 13 west. The Eastport mine works a bed 4 to 5 feet thick, running north and south, with an average dip of 8° west. The bed is divided by 6 inches of clay slate. The coal from the gentle pitch of 8° flattens out as the bottom of the mine is approached.

The Newport mine is in the same region, working the same bed as the Eastport. There are few faults or disturbances in the present mines.

WASHINGTON TERRITORY.—The Bellingham Bay coal-bed in Washington Territory is 14 feet thick, with a dip N. 57° W. The coals are interstratified with slate and "bone" or slaty coal. Only half of the bed is mined, the lower half being dirty and of no value.

The coal-bed upon which the Renton mine is located lies in sections 17, 20, and 29, township 23 north, range 5 east, Willamette meridian. There are two beds now being worked: the upper one is 17 feet thick, interstratified with "bone," and yielding 10 feet of good coal. The lower one is 13 feet thick, yielding 8 feet of good coal. The measures strike south 10° west, and dip 15° east. These two beds are separated by 80 feet of sandstone. The coal is hauled two miles by rail to Black River, thence on barges or by rail to Seattle. The Seattle mine is 10 miles south-east of Seattle. The land in this neighborhood was first explored in 1868, and the first coal mined in 1871. The coal-field is on the east shore of Lake Washington, and contains six distinct beds—the upper one 5 feet thick, in soft sandstone; the lower bed, 8 feet thick, of good coal. The middle beds are poor.

TABLE XXXI.—*Analyses of Coals of the Pacific Coast.*

	Moisture.	Fixed carbon.	Vol. matter.	Ash.	Sulphur.
Mt. Diablo, Cal.	14·69	46·84	33·89	4·58	
Coos Bay, Oregon	20·09	41·98	32·59	5·34	
Bellingham Bay, Wash. Ter.	8·39	45·59	33·26	12·66	
Seattle, Wash. Ter.	11·66	45·98	35·49	6·44	0·43
Nanaimo, Vancouver's Island	2·98	46·31	32·16	18·55	
Cook's Inlet, Alaska	1·25	49·89	39·87	7·82	1·20

TABLE XXXII.—*Production of Bituminous Coal and Lignite West of the 100th Meridian.*

Name of State.	Number of counties.	Number of establishments.	Total product census years, tons (2000 lbs.).	Value of total product.	Value of materials used census year.	Wages paid to all classes.	Total employés.	Number of steam-engines.	Horse-power of engines.	Value of plant.	Value of real estate.	Total capital employed and invested.	Acres of coal land.
Total	20	46	1,477,736	$3,272,470	$189,431	$1,828,401	3,441	42	1,447	$1,251,342	$6,858,300		
California	3	6	236,950	663,013	44,013	321,950	751	8	295	[illegible]	[illegible]	[illegible]	[illegible]
Colorado	8	25	462,747	1,041,350	114,576	714,714	1,434	20	749	[illegible]	[illegible]	[illegible]	[illegible]
Montana Territory	1	1	224	800	...	400	3	...	...				
Oregon	1	3	43,205	97,810	8,567	68,017	76	1	60				
Washington Territory	3	5	145,015	389,046	21,203	143,754	168	4	115				
Wyoming Territory	4	6	589,595	1,080,451	1,072	579,566	1,009	9	228				

All the coal shipped from these mines goes to San Francisco. There were sent in 1881—from the Renton mine, 12,708 tons; from Seattle, 134,710 tons; total, 147,418 tons. It is estimated that the amount used locally and supplied to steamships in the bay brought up the total output to 160,000 tons.

The Bellingham Bay coal has an extensive reputation as the best on the Pacific coast, and its use is growing very rapidly, the exports from Seattle having grown from 4918 tons in 1871 to 147,418 in 1881; the total shipments for the eleven years included being 876,558 tons. The field is being rapidly developed by railroads, and new mines are being opened.

UNITED STATES GOVERNMENT COAL-LANDS.—The officials of the General Land Office at Washington made a compilation from their surveys, from which they estimated that the total number of acres of coal-lands owned by the United States was as follows:

	Acres.	Acres.
Washington:		
Area	829,440	
Sold	3,350—	826,090
Oregon:		
Area	414,720	
Sold	185—	414,535
California:		
Area	247,820	
Sold	1,800—	246,020
Colorado:		
Area	1,128,225	
Sold	600—	1,127,625
Utah:		
Area	2,764,800	
Sold	2,180—	2,762,620
New Mexico:		
Area	10,800	
Sold	720—	10,080
Wyoming: at least		42,000
North and South Dakota: at least		50,000
Montana: at least		50,000
Arizona: no coal yet discovered.		
Nevada: no coal yet discovered.		
Nebraska: the coal-bearing rocks cover an area of 3600 square miles, but on account of the smallness of the beds—none exceeding 1 foot—the coal is of no commercial value.		
Indian Territory: the coal-bearing rocks cover an area of 13,600 square miles.		
Arkansas: the coal-bearing rocks cover an area of 12,000 square miles.		
		5,528,970

The laws regulating the sale of lands of the United States containing coal provide "that any person above the age of twenty-one years, who is a citizen of the United States, or who has declared his intention to become such, or any association of persons severally qualified as above, shall, upon application to the register of the proper land-office, have the right to enter, by legal subdivision, any quantity of vacant coal-lands of the United States, not otherwise appropriated or reserved by competent authority, not exceeding 160 acres to such individual person, or 320 acres to such association, upon payment to the receiver of not less than ten [illegible] per acre for such lands where the same shall be [illegible]d more than fifteen miles from any completed [illegible]road, and not less than twenty dollars per acre for [illegible]ds as shall be within fifteen miles of such [illegible] in [illegible] possession of land, and who has [illegible]ve preference of right of entry. [illegible] more than four persons who have expended $5000 on coal-workings can enter not exceeding 640 acres. The act allows only one entry by the same person or association of persons. Payment for lands must be made within one year after the filing of the entry.

ALASKA.—Good bituminous coal has been found at Port Gardner, Hood Bay, Admiralty Island, in Alaska, and also at Hamilton Harbor, on the east side of Kake Strait. A 6-inch seam is reported as found in hard rock, with a southerly dip of 35°, at Kuin Island, Kuprianoff Island, and Port Camden. At Cape Beaufort, on the Arctic coast, a small seam of true Carboniferous coal is found.

Most of the coal in Alaska is Tertiary, and inferior to the Carboniferous coals. The deposit at Cook's Inlet is the most promising. North of Cape Starichkoff the coal is found in two parallel layers, variously reported from 18 inches to 7 feet in thickness, and from 36 to 60 feet below the top of the bank. To the north a third layer appears.

The U. S. revenue cutter Corwin in 1882 found beds of coal on the coast of Alaska, within the Arctic Circle. Numerous beds were exposed on the face of a bluff about 150 feet high. They pitched at an angle of 45°, and varied in width from 3 to 20 feet. They could be traced for miles on the "tundra," or grassy plain, which ended in the bluff. The coal is described as a semi-anthracite, which burned well and made little smoke, but left a large percentage of ash. It is probably a good variety of lignite.

CANNEL COAL.

Near Greensburg, in Beaver co., *Pennsylvania*, is a bed of cannel coal about 8 feet thick, resting on about 3 feet of ordinary bituminous coal. This cannel is light, compact, ignites with great facility, and burns with a strong bright flame.

The famous Stockton bed at Cannelton, Fayette co., *West Virginia*, contains 3½ feet of excellent cannel coal and 22 inches of splint coal.

Cannel coal is also found in Kentucky, Ohio, Illinois, Missouri, Indiana, and, we believe, in Tennessee. It is not commended for any purpose of iron making and manufacture, but is suitable for steam-engines.

Kentucky.—At Hawesville, on the left bank of the Ohio, 120 miles below Louisville, is a coal-bed 4 feet thick. The upper eighteen inches of this bed consist of cannel coal; the remainder is common bituminous coal. Its analysis, by Dr. Jackson, shows—carbon, 48·40; bitumen, 48·80; ashes, 2·80. The price of this coal at New Orleans is from sixty-two and a half cents to one dollar per barrel of two and a half bushels. It is in request there for the use of the towboat companies. Hawsville is about 258 miles above the mouth of the Ohio. The coal-seam is nearly horizontal, appearing on both sides of the river, in a position remarkably favorable for loading into vessels lying in the Ohio. It is a compact, largely conchoidal coal, producing a bright flame—does not cement or adhere together in burning, but, on the contrary, falls into a profuse white ash, much larger in amount, practically, than the analysis indicates. It is specifically lighter than common bituminous coal, yet heavier than the cannel coal of Lancashire and Yorkshire, as is shown by the following statement:

Kentucky or Hawesville cannel, specific gravity	1·250
Jackson county cannel coal, Ohio	1·410
Lancashire cannel	1·199
Ingleton cannel, Yorkshire	1·195

Indiana.—The Cannelton coal of Indiana is found in that part of the coal-field which is intersected by the Ohio River, about 120 miles below Louisville by water, but scarcely more than half that distance in a straight line. The seam varies from 3 to 4 feet in thickness, and occasionally expands to nearly 5 feet. It is mined at an elevation of 70 feet above the Ohio River. The coal can be furnished at a low price. It burns freely, yields a pleasant flame, and affords a light sufficiently strong to read by. Prof. Johnson observes that the fracture is often conchoidal, and the lustre dull, like that of Scotch cannel coal. The mean result of two specimens gave

Fixed carbon	59·40
Moisture and other volatile matter	34·90
Earthy matter	5·70
	100·00

Iowa.—A bed of pure cannel coal 5 feet thick has been discovered in Red Rock township, in Warrior co., Iowa, 30 miles from Des Moines. Samples tried by a gas company are pronounced equal to West Virginia cannel.

Missouri.—A very fair cannel coal is found at several points in Callaway co., Mo., north of the Missouri River and on each side of it, 120 miles above St. Louis. Extraordinary statements have been made of the immense thickness of the Calloway county bed of cannel coal. At one point it is said to be 24 feet, and at another 46 feet, in thickness. In Cole county, a few miles from Côte-sans-Dessein, it is affirmed that a shaft has been sunk 32 feet into the coal without getting through the stratum; probably an oblique section of the seam. It is well adapted for steam, gas, and iron manufacture.

Texas.—At a point on the Rio Grande River 27 miles above Laredo, in Texas, a bed of cannel coal has been developed by a tunnel or drift, and is used to supply the Rio Grande and Pecos Railroad. At the outcrop the bed is 3 feet thick, but at 650 feet from the surface it has a thickness of 4 feet. It is said to be a pure cannel, and very hard. The strike of the bed is north-west and south-east, and its dip 6 inches per 100 feet. There is said to be a great deal of coal in the vicinity of Laredo, though much of it has been consumed in the ground by spontaneous combustion. The country has not been explored sufficiently to procure specific data.

Gas Coal.

The varieties of coal best suited for the manufacture of gas are the bituminous coals, especially the caking and cannel varieties. Some asphaltic materials, like albertite, can be used as enriching materials, but never alone. They produce large quantities of gas, but their cost limits the quantity used. Cannel coal yields the richest gas, and is much used in England, but caking coal is the material in most general use. The advantage of this variety is in its abundance and consequent cheapness, and in the fact of its furnishing coke of value. Gas from caking coal is inferior in illuminating power. The percentage of sulphur in gas coal is a matter of considerable importance. Half of the sulphur remains in the coke, while the other half goes into the gas, and must be removed by purification, thus increasing the cost of the process. Nova Scotia coals contain 3 to 5 per cent. of sulphur; Red Bank, Pa., 0·89; Westmoreland, Pa., 1·50; Murphy's Run, W. Va., 1·88 to 3·06; Orrell, Eng., 1·75 to 2·34. The last column in the accompanying table shows the number of feet of gas purified by one bushel of lime, which is a tolerable indication of the amount of sulphur that goes into the gas:

Table XXXIII.—*Analyses of Gas Coals.*

	Volatile matter.	Fixed carbon.	Ash.	Gas per ton of 2240 lbs., in cu. ft.	Candle-power of gas.	Coke per ton of 2240 lbs.		Gas in cu. ft. purified by 1 bu. lime.
Caking Coals:								
New Castle, England	32·70	65·55	1·75	10,057	10·11	1536	49	3509
Glace Bay, Cape Breton	...	...	...	9,560	12·50	1484	38	1945
Lingan, " "	35·20	60·80	4·00	9,520	12·92	1450	42	2209
Block House, " "	40·80	57·70	1·50	10,217	17·32	1460	40	2304
Pittsburg, Pa	36·76	51·93	7·07					
Westmoreland, Pa	36·00	58·00	6·00	10,642	16·62	1544	40	6429
Sterling, Ohio	37·50	56·90	5·60	10,528	18·81	1480	36	3993
Despard, West Va	40·00	53·30	6·70	10,765	20·41	1540	36	2494
Cannel Coals:								
Kirklees Hall, England	40·30	56·40	3·30	10,012	21·47	1410	36	2000
Darlington, Pa	43·00	40·00	17·00	9,800	34·98	1320	32	2936
Peytona, West Va	46·00	41·00	13·00	13,200	42·79	1380	32	4519
Enriching materials:								
Boghead mineral, Scotland	51·60	15·70	32·70	13,619	26·45	1378	35	3400
Grahamite, West Va	53·50	44·50	2·00	15,000	28·70	1056	44	
Albertite, New Brunswick	57·70	41·90	0·40	14,784	49·55	806	16·8	
Wollongongite, Australia	82·50	6·50	11·00	13,716	131·00	424	...	5696

Nova Scotia.—The *Cumberland* coal-field is the largest Carboniferous tract in Nova Scotia. It extends along the whole line of coast, and as far inland as the base of the range of mountains stretching along the northern coast of the Bay of Fundy. It displays one of the finest natural sections of coal-formation to be found in the world, considered merely as a section for illustration. The whole series has a thickness of 14,570 feet, with seventy-six seams of coal, thirty of which are 1 inch or less in thickness, and few of them more than 1 foot. The beds rise at an angle of 19°. The principal coal in this field is the Joggins

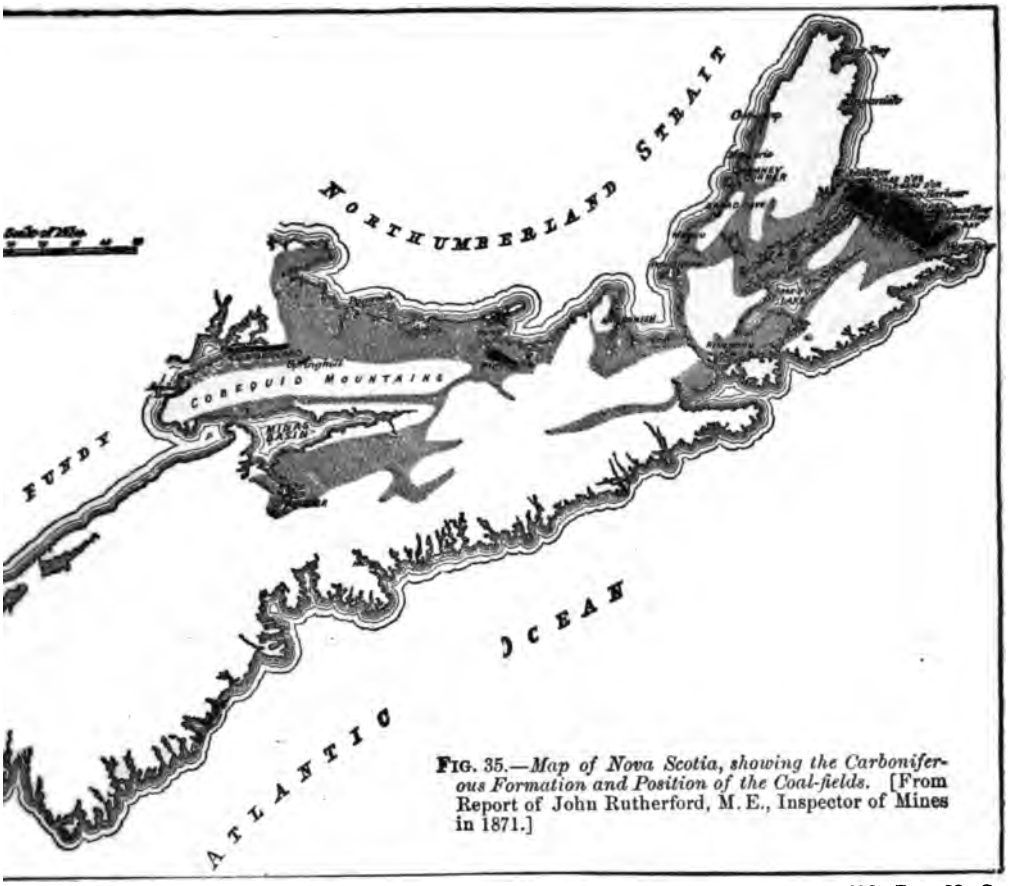


FIG. 35.—*Map of Nova Scotia, showing the Carboniferous Formation and Position of the Coal-fields.* [From Report of John Rutherford, M.E., Inspector of Mines in 1871.]

n, consisting of two beds, 3½ and 1½ feet
t Spring Hill there are six or seven workable
h a total thickness of 42 feet of coal. The
importance of this field is not great.

ion from Cranberry Head to Stubbard's Point.

	Ft.	In.	Ft.	In.
and shale	16	6		
			0	1
y and shales	5	0		
berry Head, top seam			3	8
	15	8½		
berry Head, bottom seam			1	0
	245	8		
hale			1	1
	17	3		
d's Cove			5	0
	250	3		
hale			1	4
	106	11		
hale			2	1
	2	5		
			0	4
	21	3		
			0	3
	163	8		
			0	4
	178	9½		
seam			6	0
	43	1		
			0	9
	12	1		
			0	4
	1078	7	22	3

	Ft.	In.	Ft.	In.
Brought forward	1078	7	22	3
Measures	130	11		
Coal and shale			0	11
Measures	76	9		
Coal			0	4
Measures	46	0		
Coal and shale			0	8
Measures	26	10		
Coal			1	3
Measures	120	4		
Coal, Indian Cove Seam			4	8
Measures	61	9		
Coal			0	11
Measures	21	11		
Coal			1	4
Measures	20	10		
Coal			0	7
Under-clay	8	11		
Coal			0	2
Under-clay and shale	12	6		
Coal			0	2
Measures	74	9		
Coal and shale			0	10
Under-clay	1	0		
Coal			0	0½
Under-clay and soft blue clay	0	10		
Coal and shale (Stony seam)			3	2
Clay and shales	1	11		
Coal and shales			1	0
Sandstone and shale	65	2		
Coal			1	0
Under-clay and shale	2	9		
Coal			0	1
Sandstone	69	7		
	1821	4	39	4½

The coal-field of *Colchester* and *Hants* is separated from the former-described field by the Cobequid chain of hills. The coal-seams appear to be all under 18 inches in thickness.

The coal-field of *Pictou* contains two thick beds of coal, the upper 37 feet (largely worked at the Albion mines), accompanied by three other workable beds, having an aggregate thickness of nearly as much more, separated by 157 feet of strata. The last three beds are divided by partings of inferior coal and ironstone. The beds incline at an angle of 20°; only 12 feet of the upper part of the seam are now worked. The coal is high in ash. (See fig. 36.)

Pictou Field: Dip, 20° N. E.—Success Engine Pit.

		Ft.	In.	Ft.	In.
Measures		73	0		
Coarse coal.	Main seam, 37 coal.			0	2
Good "				5	0
Ironstone.		0	6		
Good coal.				14	4
Ironstone.		0	4		
Coarse coal.				7	7
Ironstone.		0	4		
Coarse coal.				3	1
Ironstone.		0	4		
Coarse coal.				2	11
Ironstone.		0	5		
Coarse coal.				4	11
Ironstone and shales		157	7		
Bad coal.	Deep seam, 20 coal.			0	2
Good "				3	10
Ironstone.		1	2½		
Coal.				3	7½
Slaty coal.				0	9½
Good "				4	2
Coarse "				1	0½
Good "				3	8
Inferior coal				6	3
		233	8½	61	6½

Forster Pit.

	Ft.	In.	Ft.	In.
Measures	450	0		
Coarse coal			4	0
Black shale	1	0		
Good coal			10	0
Fire-clay	3	0		
Good coal			23	0
	454	0	37	0

Richmond and Cape Breton Coal-field.—According to M. R. Brown, the productive measures here cover an area of 250 square miles, with a thickness of 10,000 feet of strata. North-west of Sydney Harbor there are four beds, containing 20 feet of coal in a thickness of 1500 feet. The respective thicknesses are 3 feet 8 inches, 5 feet, 6 feet 9 inches, and 4 feet 8 inches. There are good coal-seams at Lingan and Bridgeport; one contains 9 feet of coal—a fine coke and good gas coal. Prof. Lesley's description of the fields of Nova Scotia says the coal-beds on Great and Little Glace, Cow, and Miré Bays are of handsome size and highest quality. The beds north of Sydney Harbor are more limited in area, thinner and poorer in quality, and are reached at great depths.

No. 3 Pit, Glace Bay Colliery.

		Ft.	In.	Ft.	In.
Measures		61	0		
Coal				1	0
Measures		56	3		
Coal, coarse.	Stub seam			2	0
Coal, good...				8	6
		117	3	11	6

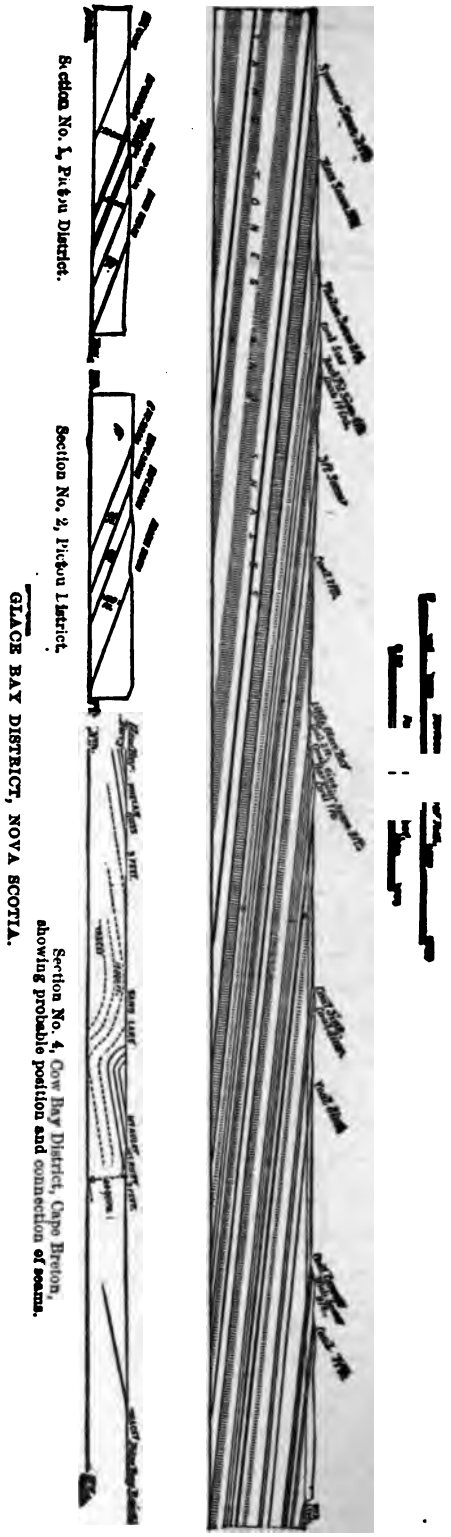
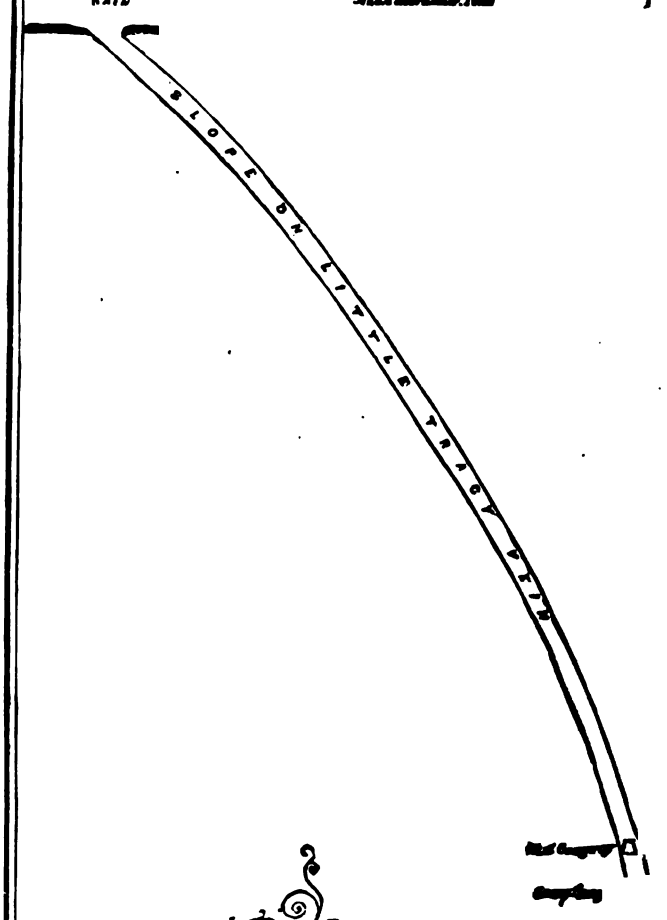

Section No. 1, Pictou District.
Section No. 2, Pictou District.
GLACE BAY DISTRICT, NOVA SCOTIA.
Section No. 4, Cow Bay District, Cape Breton, showing probable position and connection of seams.

FIG. 36.—*Glace Bay District, Nova Scotia.*



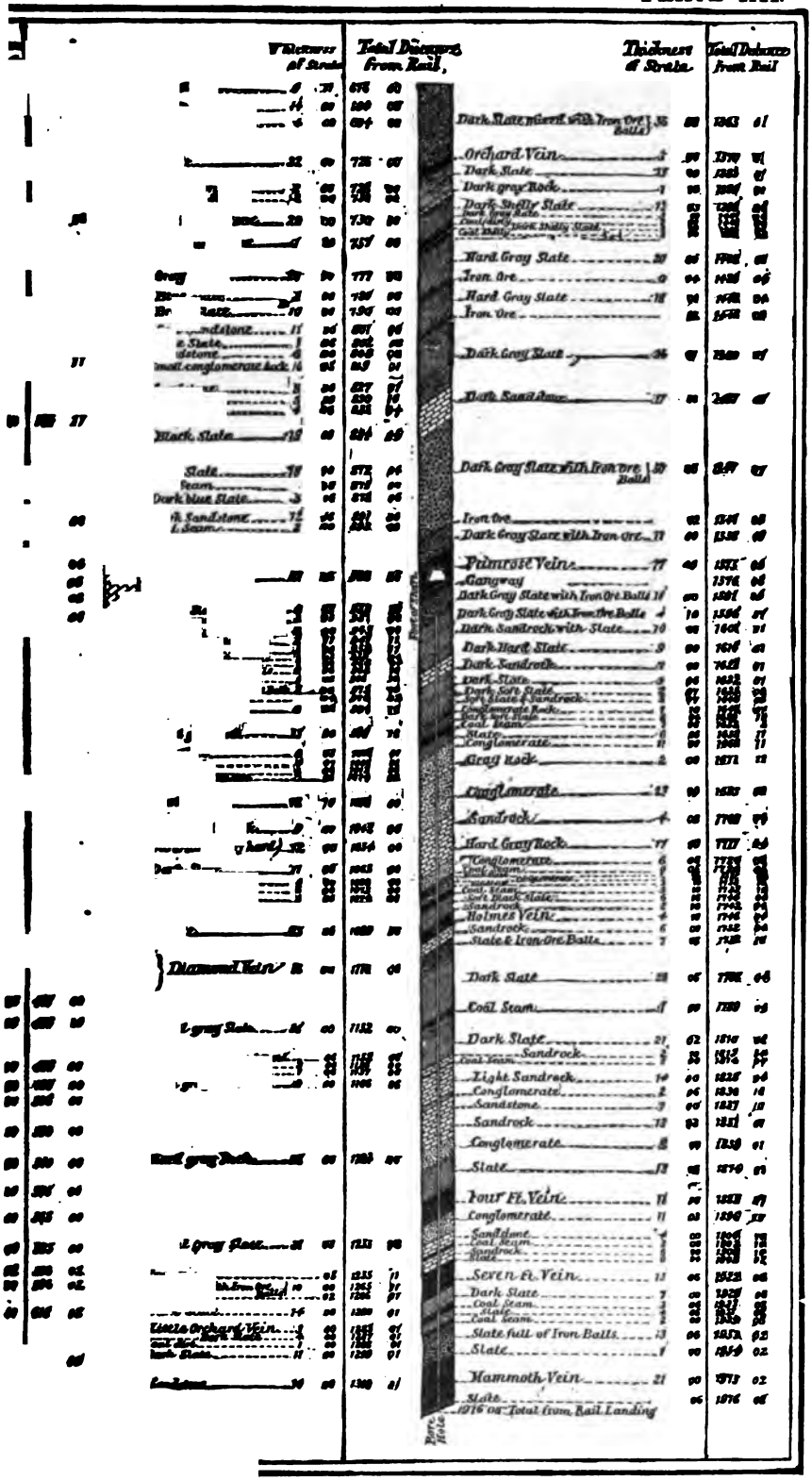
VERTICAL SECTION of EAST SHAFT,

Pottsville Collieries.

P. & R. C. & I. Co.

S. B. Whiting, Chief Eng.

Scale


Thickness of Strata
Total Distance from Rail
Dark Slate mixed with Iron Ore Balls
Orchard Vein
Dark Slate
Dark gray Rock
Dark Shelly Slate
Hard Gray Slate
Iron Ore
Hard Gray Slate
Iron Ore
Dark Gray Slate
Dark Sand Rock
Dark Gray Slate with Iron Ore Balls
Iron Ore
Dark Gray Slate with Iron Ore Balls
Primrose Vein
Gangway
Dark Gray Slate with Iron Ore Balls
Dark Gray Slate with Iron Ore Balls
Dark Sandrock with Slate
Dark Hard Slate
Dark Sandrock
Dark Slate
Dark Soft Slate
Dark Slate & Sandrock
Conglomerate Rock
Dark Slate
Coal Seam
Slate
Conglomerate
Gray Rock
Conglomerate
Sandrock
Hard Gray Rock
Conglomerate
Dark Slate
Coal Seam
Soft Black Slate
Sandrock
Holmes Vein
Sandrock
Slate & Iron Ore Balls
Dark Slate
Coal Seam
Dark Slate
Sandrock
Coal Seam
Light Sandrock
Conglomerate
Sandstone
Sandrock
Conglomerate
Slate
Four Ft. Vein
Conglomerate
Sandstone
Coal Seam
Sandrock
Slate
Seven Ft. Vein
Dark Slate
Coal Seam
Slate
Coal Seam
Slate full of Iron Balls
Slate
Mammoth Vein
Slate
1916 08 Total from Rail Landing

Engine Pit, Caledonia Colliery.

	Ft.	In.	Ft.	In.
res.	36	9		
			1	2
res.	19	7		
Black Pit seam			4	9
res.	65	7		
			4	8
	28	7		
			0	2½
shale	0	10		
			0	1½
shale	0	9		
			0	1
ires.	13	10		
Phelan seam			8	3
gray sandstone	4	1		
	170	0	19	3

e Pictou field is small and yields poor fuel. The hibit great thickness, but this seems to be local. contents of the beds in the largest basin is about 300,000,000 tons. The Pictou coal is full and the North Sydney of sulphur.

Average Analysis.

Volatile matter	33·481
Fixed carbon	61·873
Ash	4·223
Sulphur	2·39

of Nova Scotia are of a soft bituminous Carormation. There are nine districts, but the Cape Breton are the most important. A letS. Poole, an experienced civil and minof Stellarton, N. S., dated March 23, 1882, ise information about the extent of the ields. He says: "I now give you every , according to our present knowledge, in seam approaching workable thickness within 4000 fe and a distance of 4 miles from a , is supposed to exist. with *Cumberland* county, seams of ness are only known on the northern rops of the basin; to the south their representatives are only a few inches in thick. The workable seams dip at angles from 19° to and would even reach the assumed limit of 4000 Leases have been given by the Government to only 66 square miles, and they are known to a good deal of barren ground. The control of selected square miles would certainly cut off all etition in this county. In *Pictou* county Governleases cover 29 square miles, and no seam of value utside them. In other parts and isolated spots in Scotia proper—as, for example, near Antigonish explorations made have only shown the seams ex to be thin, stony, or highly faulted and inclined, fore, so far as at present known, unworkable. move to *Cape Breton* all the workable seams the coast, dipping seaward. Those in *Richmond* counties would be included in In *Victoria* and *Cape Breton* counthe principal coal-field, the extreme limits be ed in a block of uniform size 35 miles by 8 which would cover not only the known the , but also the available area under to under such an area would op icted under the foreshore e with , to secure approaches ield. From these figselecting 400 square miles, I don't know where to find in Nova Scotia one square mile of workable coal."

TABLE XXXIV.—*Nova Scotia Coal Exported to the United States.*

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	98,173	24 *ad.*	1866	404,252	$1.25
1851	116,274	"	1867	338,492	"
1852	87,542	"	1868	228,132	"
1853	120,764	"	1869	257,485	"
1854	139,125	Free.	1870	168,180	"
1855	103,222	"	1871	165,431	"
1856	126,152	"	1872	154,092	.75
1857	123,335	"	1873	264,760	"
1858	186,743	"	1874	138,335	"
1859	122,720	"	1875	89,746	"
1860	149,289	"	1876	71,634	"
1861	204,457	"	1877	118,216	"
1862	192,612	"	1878	88,495	"
1863	282,775	"	1879	51,641	"
1864	347,594	"	1880	123,423	"
1865	465,194	"			

NOTE.—The quantities given for the years 1850 to 1872 are on the authority of the Board of Trade of Philadelphia, and are probably under-estimated.

There has been a great increase recently in the output of Nova Scotia coal. In 1879 the yield was 688,624 tons. In that year a duty of 50 cents a ton on importations of anthracite and 60 cents a ton on bituminous coal was imposed, and the quantity mined was increased to 1,989,263 tons in 1888, while the demand is still greater than the supply.

The total amount of coal exported from Canada during the fiscal year 1889–90 was 935,193 tons, and the total amount imported 1,931,821 tons, of which 795,753 tons was anthracite and 1,136,068 tons bituminous.

TABLE XXXV.—*Coal Product of Nova Scotia during the Year ending Dec. 31, 1880* [*from Department Report*].

Collieries.	Seams	Product.
CUMBERLAND COUNTY.		
Chignecto	North Seam	1,098
Joggins	Joggins' Main	18,350
Minudie		308
Scotia	North Seam	422
Spring Hill	Black and South	127,907
PICTOU COUNTY.		
Acadia	Acadia	94,907
Albion Mines	Main and Deep	199,611
Intercolonial	Acadia	81,254
Vale	McBean	86,522
CAPE BRETON COUNTY.		
Block House	Block House	48,475
Caledonia	Phelan	18,589
Glace Bay	Harbour	24,371
Gowrie	McAulay	46,990
International	Harbour	68,131
Lingan	Lingan	31,758
Ontario	Phelan	8,695
Reserve	Phelan	37,621
Sydney Mines	Main	148,254
INVERNESS COUNTY.		
Broad Cove		5
VICTORIA COUNTY.		
New Campbellton		4,925
	Total	1,033,198

NEW BRUNSWICK, CANADA.—*Anthracite.*—During the years 1874–78 considerable money was spent in developing a seam of anthracite in Devonian rocks of Belais Basin, Lepreau. Four shafts have been sunk, the greatest depth being 140 feet. The coal is similar to that of Massachusetts and Rhode Island, poor and glazed with plumbago. The large percentage of ash

(36 per cent.) is strongly against the use of this coal as a combustible, while its irregular distribution and impure character are strong obstacles to its successful development. A large part of what has been called "coal" is nothing but carbonaceous shale, and this constitutes the bulk of the seam, the thickness of the harder or anthracite band being only a few inches.

Grand Lake Coal-field.—On the shore of Grand Lake borings have been made 170 to 400 feet. No coal has been shown but the surface seam. The extent of the seam is great along New Castle Creek, Salmon River, Salmon Creek, and Coal Creek. The thickness varies from 10 to 20 inches. The field contains about 100 square miles. The seam is worked, it is supposed, profitably. The seam is seen in other places, and if it covers the intermediate area would make the extent much larger. The coal-formation extends over much more ground (nearly 6000 square miles), but workable coal is limited to the above extent.

Lignite is found in the soft brown shale of the Triassic formation in St. John county.

Albertite in New Brunswick.—A substance analogous to coal is found at Hillsborough, Albert co., N. B., near the head of the Bay of Fundy. It is used in the manufacture of oil and gas. Unlike coal, it is found in a true vein or filling a crevice in the rocks. It is now considered a variety of asphalt, or a solid hydrocarbon derived from the decomposition of vegetable or animal products. It has a beautiful and singular appearance, with a resplendent resinous lustre and perfect conchoidal fracture. It is perfectly free from mineral charcoal, and is divided into prismatic pieces by a great number of smooth divisional planes. It was discovered in 1849, and there were shipped 19,267 tons in the three years 1869–71. It yields 100 gallons of crude oil per ton, or 14,500 cubic feet of gas of superior quality. A late consular report says this deposit shows signs of exhaustion.

PRINCE EDWARD ISLAND.—There is no known coal of workable thickness yet developed in this country. The surface rocks are all Permian. The Carboniferous formation may underlie them.

VANCOUVER'S ISLAND.—At Nanaimo, in Vancouver's Island, about 70 miles above Victoria, there is a coal-deposit of the same geological age as that at Bellingham Bay, Wash. Ter. It is worked by the Vancouver's Island Coal Co. The coal-measures extend over the whole eastern coast of the island. On the island and on the opposite coast of America there are extensive deposits of the Tertiary and Cretaceous ages, bearing beds of lignite and coal, which are extensively worked for the supply of the steamers navigating between Victoria and the Fraser River. Of this coal that obtained from Nanaimo is admitted to be the best.

Dr. J. Hector, who accompanied Capt. J. Palliser's expedition in 1857–60, has determined the geological age of the lignites of North-western America and Vancouver's Island to be Cretaceous, though others of inferior quality and Tertiary age also exist. Prof. Newberry's analysis of the Vancouver's Island coal gives—carbon, 51·81; volatile matter, 44·30; and ashes, 3·89.

QUEEN CHARLOTTE'S ISLANDS COAL.—Mr. Richardson, of the Canadian Geological Survey in 1872, reports on the Skidegate Inlet a bed of true anthracite in rocks of the Cretaceous age; which report was affirmed by Prof. Dawson in 1878. The Cowgitz coal-mine is opened on the outcrop, about one mile from Anchor Cove. The Queen Charlotte Coal-mining Company (limited) was formed in Victoria in 1865. A large sum of money was expended, and the enterprise abandoned in 1872 after building a tramway, wharf, etc. The coal, when first struck by a tunnel, showed from 2 to 3 feet thick of good anthracite. At a short distance farther it increased to about 6 feet, in which were two beds of pure coal, averaging 3 feet, and 1 foot 3 inches of shaly midrib. Where the work was stopped the seam had gradually narrowed. This outcrop, called King's Vein, was discovered in 1867. In 1869, 800 tons of coal were shipped to Victoria. The quantity of inflammable gas exuding from shales is so great as to necessitate safety-lamps. The following is a cross-section of the coal-beds:

Coal, good anthracite			6 inches.
Black argillaceous shale	4 feet	6	"
Coal, good anthracite	2 "	5	"
Black argillaceous shales	11 "	0	"

Analysis.

	Water.	Volatile matter.	Fixed carbon.	Sulphur.	Ash.
I	1·60	5·02	83·09	1·53	8.76
II	1·89	4·77	85·76	0·89	6·69

MEXICO.—The anthracite coal-deposits of Mexico are situated in the district of Hermosillo and state of Sonora, 120 miles south-east of Hermosillo and 130 miles easterly from the city of Guaymas. The coal-bearing rocks are of the Triassic formation, and are embraced in a series of rugged mountains which extend from San Antonio de la Chueba to Onaras, and in width from a north-and-south line through the junction of the San Migeleta and Tecorepa roads to and east of the Yaqui River, embracing the towns of La Barranca, Los Bronces, San Xavier, Loda Campa, etc. These rocks form an irregular chain of high and rugged mountains greatly disturbed and broken, then eroded into deep ravines. The rocks have an irregular easterly dip varying from 25° to 50°. The coal-beds have been opened at three localities—one 3 miles northerly from La Barranca; another at Los Bronces, about 7 miles easterly; and a third near San Antonio, northeast from La Barranca.

The Santa Clara opening is in a small ravine 300 feet vertically above the Yaqui River. The coal-bed is cut by a shaft 40 feet deep, by a tunnel 60 feet long, and by a drift 80 feet above the other openings. It is a limited deposit, as efforts to trace it outside of the ravine have shown. The bed is 9 feet thick, dipping 25° to the east. It is covered by only 5 feet of loose earth.

The coal near San Antonio is opened by a shaft, showing a 4-foot bed, near the summit of the hill 800 feet above the level of the Yaqui River, and seems to be an isolated basin.

In the Los Bronces Cañon seven beds of coal are opened, ranging from 2 to 7 feet thick, as follows: No. 1, 18 inches; No 2, 30 inches; No. 3, 36 inches; No. 4, 80 inches; No. 5, 81 inches; No. 6, 4 inches; No. 7, 9 inches; total, 31 feet 9 inches. These beds are contained in about 2500 feet of arenaceous rocks, dipping 20° to 25° east. The strike of the measures is N. 60° E. The character of the coal is generally good, free from slate and bone, but of such a very thinly-laminated, fractured, friable nature that it makes a large percentage of fine coal. It cannot be coked, and is generally considered a good grade of anthracite coal. The following analyses of Los Bronces coal were made from samples gathered by W. S. Sheafer, E. M., of Pottsville, Pa., who reports that the beds contain good coal, but that he could not find any large quantity. It is

hracite, and not of the true coal-measures:

isture	8·45	8·09
ve matter	6·05	6·108
Fi... arbon	80·85	80·159
Ash	4·65	5·643
	100·00	100·000

t *Santa Rosa* district there are vertical seams hracite; 30 or 40 miles to the eastward of occur bituminous coals. Lignites are found olaces in Northern Mexico, the veins being of able thickness and excellent quality. They lu phur in considerable quantities. Near San ere are some true brown coals. In a report ecretary of the interior of Mexico, by Santiago rez, on the coal-fields of the Matamoros, Izucar, ita, and Acatlan districts, in the state of Puebla, gentleman gives some analyses of coal which are s and do not speak well for the greater num- f the deposits. The following is a summary of :

TABLE XXXVI.

Mine.	Fixed carbon.	Volatile matter.	Ash.
spectativa	8·00	1·00	91·00
an de Maria	43·00	16·40	40·60
	40·78	15·25	43·97
...sco	42·25	13·63	44·12
	81·00	2·00	17·00
...an	66·00	19·00	15·00
tlan	50·00	9·00	41·00
nin	62·00	31·00	7·00
le Ayuquila	76·00	14·00	10·00
	60·70	21·50	17·80

coal-field, hundreds of miles in extent, lies ... of Coahuila, on the Rio Grande, extend- ... Nuevo Leon and Tamaulipas. It has not fully explored as yet, and the following account, . H. Adams, M. E., superintendent of the Cedral is the fullest that can be obtained. These are on the western line of the field, at the base Santa Rosa Mountains, 110 miles from the Rio le. The region is volcanic. Mr. Adams says: their nearness to the coal-measures, the moun- which are protruded into the plains at this par- r point, offer a great novelty in producing vertical of coal nearly anthracitic in character, opened to th of 240 feet. Coal of a more bituminous nature nd outcropping on the rivers 30, 40, and 60 miles e eastward, and lignites in many places over a extent of country drained by the Rio Grande . The inference is, that the heat which changed tamorphic rocks drove off the bitumen, and that er one approaches the mountain-line the better duct."

... rmation is Triassic. It abounds in salt, and r is found above and below the coal. "Sur- ... gs at several points along the Salinas River, ... water-level, show veins of coal of good ... kness and of excellent quality. The ... of sulphur contained in the coal is considerable ... ated, but not so great as to require ... on. The coal cokes easily, producing ... coal. of good coke." No analyses are ... ovens were built and extensive workings carried on at the Cedral mines in the spring of 1882.

A report by Prof. Heilscher, on the Piedras Negras district, says that a coal-region there forms a high, dry plain for ten miles along the Rio Grande River, extending about six miles from the river on the American side and an unknown distance on the Mexican side. A bed of coal crosses the river. Near Eagle Pass there is a gray, finely-laminated clay overlaid by 4 feet of coal of poor quality. About seven miles north of the Omos River a good seam of bituminous coal 5 feet thick crops out. It has a dip of about 15° to the south-east.

HONDURAS.—Dr. W. G. K. Fitzgaertner reports coal very abundant on the Atlantic coast, near the river Uloa. The quality is semi-bituminous, and the deposits are considered quite valuable. No statistics are given.

COAL IN SOUTH AMERICA.

UNITED STATES OF COLOMBIA.—Coal-beds have been discovered in the province of Veragua, west of the province of Panama. Brown coal exists in great abundance and in ample quantity for the supply of the country around. This same coal-formation is found on the Isthmus of Panama and the island of Muerto. Abundant evidences of the existence of coal were met with, and outcrops of small beds were discovered upon the beach, dipping due west, at the foot of a small cliff 20 feet high. In one place steamers can approach within 100 yards of the shaft. The presence of coal has been ascertained also in other parts of the province of Panama. The coal found on the island of Muerto is said to burn freely, leaving a white residuum. Capt. Peacock considers its practical value, as compared with English coal, in the proportion of 13 to 18, and says it bears a strong resemblance to the Talcahuano coal in Chili, and probably might, when mined from a greater depth than that penetrated by his trial-shaft, be sufficiently available for steam purposes. Mr. Wheelwright is of opinion that a coal-area of undetermined dimensions stretches entirely across the Isthmus of Panama.

The island of *Santa Clara* also furnishes coal of good quality.

Coal occurs abundantly on the south side of the city of *Santa Fé de Bogotá*, and even within the limits of the city itself. The fuel is reputed to burn extremely well and to give out a great heat. It evidently belongs to the Cretaceous period, and probably is of the age of the Gault of England. It compares favorably with the coals of the Upper Missouri Valley (U. S.).

Coal has been found in the province of *Choco* at an elevation of 7680 feet, which is about the same elevation as the coal of New Mexico, of Upper California, and of Eastern Oregon, in the northern continent.

BRAZIL.—The province of *Rio Grande do Sul*, at the southern extremity of the empire of Brazil, is now known to be exceedingly rich in mineral fuel. According to the observations of Mr. N. Plant, there are three distinct coal-basins contained within the limits of lat. 30° and 32° S., long. 51° and 54° W., which are separated from each other by rolling hills of granite and schist, with trachytic and basaltic rocks. The largest of these basins occupies the valleys of the Jaguarão and Candiota, and the strata, consisting of sandstone at the top and shale, coal, and limestone below, dip southward at an angle of 10° to 15°.

The following section is given by Mr. Plant, as exposed in the escarpment of the Sierra Partida in this basin:

(1.) Ferruginous sandstone.....25 feet.
(2.) Coaly shale.....9 "
(3.) Sandy shale.....5 "
(4.) Coal.....3 "
(5.) White shale, with plants.....5 "
(6.) Coal.....11 "
(7.) Parting of blue clay.....2 "
(8.) Coal.....17 "
(9.) Shale, with fossils.....9 "
(10.) Coal.....25 "
(11.) Shales, with ironstones and ferns, resting on sandstone.

The second basin lies in the valley of the São Sepe. Two distinct beds of coal, one 7 feet, the other 14 feet thick, appear in this locality, underlying sandstone apparently the same as that which overlies the coal of the Candiota Valley. The third basin is near the town of São Jeronymo, on the banks of the Jacuahy, lat. 30°, long. 51° 30′. At a depth of 19 yards is a bed of bituminous coal 6 feet thick, below which are others interstratified with shales and ironstone.

Carboniferous deposits also occur in the province of Santa Catharina. About 45 miles N. W. of the seaport of Laguna the basin is intersected by the river Tubaro and its tributaries. In this basin five seams, from 18 inches to 10 feet, have been met with, underlying a sandstone formation.

URUGUAY.—The coal-bearing formations of the republic of Uruguay are similar to those above described. Along the head-waters of the Rio Negro beds of shale and coal are overlaid by a thick deposit of sandstone.

ARGENTINE REPUBLIC.—Along the Cordillera, in the Argentine Republic, bituminous shale and indications of coal are affirmed to be abundant, and it is also said that there are extensive beds of coal in the extreme south-west angle of the country. The formations here, like those of Patagonia, are of the Tertiary age.

CHILI.—An exploration of the coal-beds that exist so abundantly in Chili and the other republics of South America has been made by some of the most scientific engineers, miners, and geologists of that continent, and the account given by them is most satisfactory. The coast between Valparaiso and Talcahuano was hastily examined, and evidence obtained as to the presence of a vast, continuous stratum of coal. At Talcahuano seams of coal were visible in the broken cliffs. The coal has been simply taken from the surface, and no subterranean mining has been attempted. The work was carried farther by Capt. Peacock and Mr. Wheelwright. On examining the eastern and northern sides of the bay, extensive coal-strata appeared, and demonstrated the existence of coal-beds along that entire section of the Chilian coast. About 40 tons of coal were mined and sent to Valparaiso for trial. An experiment made on this coal during the exploring excursion of the steamer Peru showed a comparative consumption of 13 tons of English coal to 16 tons of the South American. It made no clinkers; the residuum lay lightly upon the bars, without adhering in the slightest degree. On her second voyage the Peru steamed 1500 miles with this fuel, which gave entire satisfaction in its use. About 5000 tons were mined at an expense of $3.65 per ton. Mr. Wheelwright says he mined several thousand tons which were of excellent quality, and adds: "The whole southern coast is nothing but a mine of coal." Mr. W. R. Johnson says of it: "In external appearance it is nearly related to many of the richest bituminous coals of America and Europe;" and in his analysis he shows it to contain 67·62 per cent. of carbon. At Talcahuano a seam 4½ feet thick was proved. In the tide-way of Penco a bed is worked about 200 yards from the beach. It has been penetrated to a vertical depth of 10 feet without passing through the coal. The most important district in Chili is that lying between Concepcion and Valdivia, which contains the two largest collieries of the country—those of Coronel Puchoco and Lota, from which the best coal is derived. According to the report of Mr. Bollaert, the Lota coal is largely used in steam-navigation along the Chilian coast, as also in copper-smelting, iron-foundries, and for domestic purposes. The Lota coal-field is estimated to contain 40,000,000 tons, and the Coronel double that quantity. A detailed section is given by Mr. W. Mundle of the coal-series at Coronel throughout a depth of 587 feet, which shows a series of sandstones and shales, with nine seams of coal or lignite, some of which are workable. The eighth seam from the top, nearly 5 feet in thickness, is described as a "very good, hard, and clean coal;" it is, however, inferior in quality to the true Carboniferous coals of Great Britain and America.

The following are the analyses of these coals:

	Talcahuano (Admiralty).	Lota.	Lota (first seam).
Ash	6·92	5·68	2·05
Carbon	70·71	78·30	83·70
Hydrogen	6·44	5·30	1·02
Oxygen. Sulphur. Nitrogen.	15·93	8·37 / 1·06 / 1·29	13·23
	100·00	100·00	100·00

Mr. Bollaert states that coal similar to that of Chili has been found along the Straits of Magellan, and indications of it observed 30 miles south of Valparaiso.

PATAGONIA.—Patagonia exhibits a great southern Tertiary formation, forming extensive groups on both sides of the chain of the Andes. These appear to be the prolongation of the series which is so largely displayed in Chili. A vast belt of Tertiary deposits, which contain brown coal and lignites, occupies the larger portion of the countries bordering upon the Pacific Ocean from N. lat. 10° to at least as low down as S. lat. 50°. The supposition is, that the whole the Tertiary range is scarcely short of that of continent, or at least 2500 miles, in the great which lignites abound. Bituminous coal has been discovered on the east shore of [illegible] South Patagonia. A consular report says [illegible] fair merchantable quality, much superior to [illegible] is taken out at Sandy Point in the Straits of The specimens, however, are only fro[illegible] and the coal is expected to improve [illegible] gresses. The coal lies in two s[illegible] in thickness, with a dip of 40° to [illegible]

COAL IN THE EASTERN HI[illegible]

GREAT BRITAIN.—Mr. Richard Meade, [illegible] keeper of mining records for Great [illegible] 1882 a complete and exhaustive work [illegible] iron resources of the British Isles. [illegible] nized as a standard authority on the [illegible]

Mr. Meade estimates the total ar[illegible] coal of the United Kingdom at 7876 [illegible] as follows:

England:	*Coal-Fields.*	Area in sq. miles.
	Durham and Northumberland	796
	Yorkshire, Derbyshire, and Nottinghamshire	800
	Cumberland	25
	Lancashire and Cheshire	220
	Leicestershire	15
	Warwickshire	30
	Shropshire	28
	North Staffordshire	75
	South Staffordshire	93—2082
North Wales:		
	Anglesea, Denbighshire, and Flintshire	90
South Wales		
	Monmouthshire	104
	Glamorganshire	518
	Brecknockshire	74
	Carmarthenshire	228
	Pembrokeshire	76
	Gloucestershire (Forest of Dean)	34
	Somersetshire (Bristol)	150—1184
Scotland		1720
Ireland		2800
	Total	7876

These fields contained in 1880 an estimated amount of 145,288,613,038 tons of available coal, a quantity sufficient to last nine hundred years at the present rate of production. All this coal is less than 4000 feet from the surface, that being the depth at which

TABLE XXXVII.—*Detailed Statement of British Coal-Fields, 1880 [Report of the Royal Commission].*

No.	Name of Coal-Field.	Amt. of coal in stat. tons to depths not exceeding 4000 ft. after necessary deductions.	Amount of coal remaining and available for future use from the year 1880.
	ENGLAND AND WALES.	Tons.	Tons.
1	South Wales	32,456,208,913	32,302,046,783
2	Forest of Dean	265,000,000	257,623,705
3	Bristol	4,218,970,762	4,207,076,209
4	Warwickshire	458,652,714	450,179,258
5	South Staffordshire	1,906,119,768	1,789,674,293
6	Colebrookdale & Forest Wyre		
7	Clee Hills		
8	Leicestershire	836,799,754	826,799,784
9	North Wales	2,005,000,000	1,986,229,493
10	Anglesea	5,000,000	
11	North Staffordshire	3,825,488,105	3,784,377,741
12	Lancashire and Cheshire	5,546,000,000	5,270,686,699 / 192,104,295
13	Midland	18,172,071,433	17,928,908,719
14	Black Burton	70,904,011	70,904,011
15	Durham and Northumberland	10,036,660,236	9,734,261,887
16	Cumberland	405,203,792	391,123,499
	SCOTLAND.		
17	Edinburgh	2,153,703,360	9,669,172,642
18	Lanarkshire	2,044,090,216	
19	Fifeshire	1,098,402,895	
20	Ayrshire	1,785,397,089	
21	East Lothian	86,849,880	
22	Frith of Forth	1,800,000,000	
23	Dumfriesshire	358,173,995	
24	West Lothian	127,621,800	
25	Perthshire	109,895,040	
26	Stirlingshire	106,475,436	
27	Clackmannanshire	87,563,494	
28	Dumbartonshire	48,618,320	
29	Renfrewshire	25,881,285	
30	Argyleshire	7,223,120	
31	Sutherlandshire	3,500,000	
32	Roxburghshire	70,000	
	IRELAND.		
33	Ballycastle (Antrim co.)	16,000,000	154,384,079
34	Tyrone	6,300,000	
35	Leinster (Queens co.)	77,580,000	
36	Tipperary	25,000,000	
37	Munster (Clare co.)	20,000,000	
38	Connaught	10,800,000	
	Total	90,207,285,398	89,015,553,038

...coal remaining ... roughs, as estimated by Prof. Ramsay, and con... and other overlying formations, amount...

Districts.	Under.	Square miles.	Tons.
Warwickshire	Permian.	73	2,165,000,000
Warwickshire, south of Kingsbury	New Red.	5	150,000,000
Warwickshire, north of Atherstone	" "	6	179,000,000
Leicestershire, Moira Dist.	Permian.	15	1,000,000,000
" Coleorton "	New Red.	25 to 28	790,000,000
District between the Warwickshire and South Staffordshire coal-fields	Permian and New Red.	116	3,400,000,000
District between the South Staffordshire and Shropshire coal-fields	" "	195	5,800,000,000
Between the South Staffordshire and Colebrookdale coal-fields to the Cheadle and North Staffordshire coal-fields	" "	200	4,580,000,000
East of the Denbighshire coal-field	" "	50	2,489,000,000
West and south-west border of the North Staffordshire coal-field	" "	50	1,500,000,000
Cheshire, west of the Kerridge	" "	9	62,000,000
Cheshire, between Woodford Fault and Denton	" "	36	1,190,000,000
Lancashire, east and west of Manchester	" "	30	350,000,000
Lancashire, west of Eccles and Stretford to Prescot, Runcorn, and Hale-on-the-Mersey	" "	130	3,883,000,000
The Irwell, the Mersey, and country to the N.	" "	216	3,000,000,000
Yorkshire, Derbyshire, and Nottinghamshire	" "	900	23,082,000,000
Vale of Eden	" "	40	1,593,000,000
Ingleton and Burton	" "	3	83,000,000
Severn Valley	New Red Marl.	45	400,000,000
Scotland	Permian.	No estimate.	
Ireland, Tyrone	New Red Marl.	4	27,000,000
Total of concealed coal-fields		...	56,273,000,000

With these available resources, and an annual output of nearly 147,000,000 tons supplies are ensured for 920 years hence.

TABLE XXXVIII.

Coal-Fields.	No. of Collieries in 1880.	1860.	1870.	1880.
ENGLAND.				
Northumberland, North and South Durham	380	18,244,708	27,613,539	34,513,508
Cumberland	29	1,171,052	1,408,235	1,680,841
Westmoreland	3	...	...	1,950
Cheshire	28	756,500	929,150	681,000
Lancashire, North, East, and West	361	11,350,000	13,810,600	19,120,294
Yorkshire, North Riding	505	9,284,000	10,606,604	5,270
" West "				17,468,536
Derbyshire	235	4,940,000	5,102,265	7,903,834
Nottinghamshire	42		2,115,372	4,432,393
Warwickshire	32	545,000	647,540	1,101,386
Leicestershire	26	730,000	599,450	1,063,382
Staffordshire, North and South, and Worcestershire	598	7,648,300	13,230,062	13,734,800
Shropshire	61	850,500	1,343,300	905,000
Gloucestershire, Somersetshire	139	5,503,400	1,955,910	1,952,732
Monmouthshire	103	...	4,364,342	5,039,549
WALES, NORTH.				
Flintshire, Denbighshire	107	1,750,500	2,329,030	2,429,315
WALES, SOUTH.				
Glamorganshire, Brecknockshire, Pembrokeshire, and Carmarthenshire	344	6,254,813	9,299,770	16,126,031
SCOTLAND.				
Eastern District, Western District	651	10,900,500	14,934,553	18,274,886
IRELAND.	50	119,425	141,470	133,702
Total of the United King.	3694	84,042,698	110,431,192	146,968,409

Mined in 1880 — 18,660¼ tons per sq. m.
Average, 37,879 tons per colliery.

TABLE XXXIX.—*Analyses of British Coals.*

Name of Coal-Field.	Steam Coals.						Household Coals.						Coking and Manufacturing Coals.						Gas Coals.					
	Carbon.	Hydrogen.	Nitrogen.	Sulphur.	Oxygen.	Ash.	Carbon.	Hydrogen.	Nitrogen.	Sulphur.	Oxygen.	Ash.	Carbon.	Hydrogen.	Nitrogen.	Sulphur.	Oxygen.	Ash.	Carbon.	Hydrogen.	Nitrogen.	Sulphur.	Oxygen.	Ash.
Great Northern	80·69	5·36	7·27	1·57	1·24	4·23	82·97	5·92	1·40	·90	7·47	1·33	84·92	4·53	0·96	0·65	6·66	2·28	84·80	4·11	1·28	1·01	8·24	1·16
Yorkshire	80·05	4·93	1·24	1·06	8·99	3·73	80·46	5·08	1·67	1·65	6·80	3·30	81·93	4·85	1·27	0·91	8·58	2·46	80·46	5·08	1·67	1·65	8·86	1·28
Cumberland (cannel coal)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26·25	...	...	·92	...	12·36
Lancashire	75·53	4·82	2·05	3·04	7·98	6·58																		
Cheshire	...	...	...	...	...	...	...	...	...	...	...	...	85·84	0·52	1·38	0·86	...	11·40						
Derbyshire	...	...	...	...	...	...	77·49	4·86	1·64	1·30	12·41	2·30	79·85	4·84	1·23	0·72	10·96	2·40						
Nottinghamshire	...	...	...	...	...	...	...	...	...	...	...	...	79·19	5·12	1·19	1·60	10·56	2·94						
Leicestershire	74·97	4·83	0·88	1·45	11·88	5·99																		
North Staffordshire	...	...	...	...	...	...	61·79	37·35	...	0·06	...	0·80	63·50	34·85	...	0·00	...	1·65						
South Staffordshire and Worcestershire	...	...	...	...	...	...	...	...	...	...	...	...	74·41	4·63	...	0·70	16·09	2·82						
North Wales	78·00	5·31	0·56	2·30	8·82	5·05																		
South Wales	82·90	4·92	1·02	1·16	...	4·95																		
Gloucestershire	80·71	5·42	0·73	1·27	7·06	4·80	78·81	5·30	1·75	2·06	9·05	3·02	73·52	5·69	2·04	2·27	9·48	10·00						
Bristol	...	...	...	...	...	...	63·55	...	...	1·62	...	4·27	...	...	...	...	...	...	59·10	...	...	1·04	...	8·86
Devonshire (lignites)	...	...	...	...	...	...	66·31	5·62	0·56	2·36	22·86	2·36												
Scotland (Clyde basin)	...	...	...	...	...	...	55·8	5·4	34·0	2·00	...	2·8	53·22	...	...	·25	...	2·74						
Midlothian	76·94	5·20	trace	0·58	14·37	3·11																		
Fifeshire	76·09	5·22	1·41	1·53	5·05	10·70	...	...	...	...	...	...	81·36	6·28	1·53	1·57	6·37	2·80						
Ayrshire	79·82	5·82	·94	·86	11·31	1·25	88·08	6·50	1·55	1·38	8·05	2·44												
IRELAND.																								
Northern Group	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	81·04	6·21	...	...	6·64	7·41
Tyrone	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	57·06	...	...	...	1·36	8·58
Kilkenny	80·03	2·30	0·23	6·76	10·80																			

it is thought mining must stop. It is distributed as follows:

	Tons.
England and Wales	79,192,056,317
Scotland	9,669,172,642
Ireland	154,384,079
Total known coal-fields	89,015,613,038
Concealed coal-fields (overlaid by Permian and other formations)	56,273,000,000
Total coal available in 1880	145,288,613,038

It is not the purpose of this article to describe fully the numerous and extensive coal-fields of Great Britain; but the following cross-sections of the fields are of much value in the comparisons that can be drawn between the fields of the United States and those of foreign countries. The principal difference that is noticed is the great thickness of strata in the English fields, while the veins are not as thick as in the United States. Table XXXVIII. shows the output of the collieries of each coal-field in the years given.

Table XXXIX. shows the relative value of the different varieties of British coals in the several fields. Care should be taken, in comparing it with tables of analyses of American coals, to note that this table shows ultimate analyses, while, as a general rule, the other tables give proximate or commercial analyses.

In Table XL. is shown not only the thickness of the veins in the North Staffor amount of coal to the acre from the working of each

Denbighshire Coal-field.

	Yds.	Ft.	In.
Top sulphurous coal	0	4	0
Strata	70	0	10
Bottom sulphurous coal	0	4	6
Strata	10	0	7
Smiths' coal	0	2	2
Strata	12	1	1
Drowsall coal (good quality)	0	3	0
Strata	9	0	8
Powell coal	0	3	3
Strata	9	1	3
Two-yard coal	0	6	0
Strata	11	0	0
Crank coal	0	2	8
Strata, with Brassey ironstone	10	2	6
Brassey coal	0	5	0
Strata, with black-band ironstone, 18 in	10	0	11
Main coal, with a parting of clay, 18 in	0	7	6
Total thickness of strata and coal	156	0	11
Total thickness of coal		38	1

Actual size of coal-beds, from 2 ft. 2 in. to 7 ft. 6 in.

Yorkshire Coal-field, Barnsley District.

	Ft.	In.
Magnesian limestone	75	0
Lower Permian sandstone	54	0
Red rock of Rotherham	...	...
Strata	0 to 100	0
Pontefract rock	100	0
Strata	70	0
Ackworth rock	54	0
Strata	510	0
1. Shafton coal	5	0
Strata	393	0
2. Muck coal	3	10
Strata	219	0
3. Woodmoor coal	3	0
Strata, with Half-yard coal	45	0
4. Winter coal	4	0
Strata	...	...
5. Beamshaw coal	3	0
Strata, with Kent coal	1	0
Mapple coal (inferior quality)	4	0
Strata	216	0
6. Barnsley coal	9	0
Strata	198	0
7. Swallow Wood coal	3	0
Strata	234	0
8. Joan coal	2	0
Strata	60	0
9. Flockton Top coal	3	0
Strata	120	0
10. Parkgate coal	5	0
Strata	78	0
11. Thorncliffe thin coal	2	6
Strata	123	6
12. Four-foot coal (variable)	2	0
Strata	198	0
13. Silkstone coal	5	0
Strata		0
14. Whin Moor or Low Moor coal		6
Strata	About	0
Flagstone	"	0
Strata, principally shales		0
15. Halifax coal (with Pecten papyraceus in and a floor of ganister)	1	9
Strata (shales and flags)		0
16. Halifax soft coal		6
Millstone Grit		0
Total thickness of strata and coal		
Total thickness of coal		7
Total number of beds, 16.		
Average size of beds	1	

ning in Great Britain are reliable, as the Gov- has control of all the records and they are er its authority. This is a decided ad- over the system of collecting statistics and in- n the United States, where the figures vary in proportion to the number of authorities.

East Lothian Coal-field.

	Ft.	In.
Great Seam	7	0
	50	0
	4	0
ta.....from 7 ft. to	18	0
al	1	8
.....from 7 ft. to	34	0
coal	2	6
ta	9	0
coal.....from 3 ft. 8 in. to	4	11
	118	0
coal	4	0
, with blackband ironstone	130	0
al	1	6
	72	0
ough coals (16 ft. apart.)	4	0
ta	100	0
in coals (sometimes "Parrot Coal"), 16 in. to	1	6
	35	0
Total thickness of coal and strata	597	1
Total thickness of coal	31	1

Actual thickness of coal-beds, from 16 in. to 7 ft.

Antrim Coal-field.

	Ft.	In.
first coal (splint seam)	3	0
ndstones and shales	30	0
coal (Hawksnest seam)	3	0
with black-band ironstone	240	0
main seam)	4	0
with black-band ironstone	60	0
	8	0
ta, shales and sandstones	240	0
lack-band ironstone by boring)	1	0
Total thickness of strata	589	0
Total thickness of coal	10	0

Actual thickness of coal-beds, 3 to 4 ft.

he joined table appears the thickness of the s, the produce of coal and slack per acre, per acre, from Smith's *Mines Guide*, 1836:

TABLE XL.—*North Staffordshire Coal-field.*

Coal-Seams.	Thickness.	Produce per acre. Coal.	Produce per acre. Slack.	Profit per acre.
	Yds. Ft. In.	Tons.	Tons.	£ s.
coal	1 2 0	4,840	806	100 16
	1 2 0	4,840	806	100 16
Row	2 0 0	5,808	968	169 8
	2 0 0	5,808	968	169 8
Row	2 1 0	6,637	1106	304 3
Mine	3 0 0	8,712	1452	399 6
Mine	1 0 0	2,904	484	24 4
Four-foot	1 2 0	4,840	806	80 13
Five-foot	1 2 0	4,840	806	221 0
n	1 0 6	2,904	484	105 1
rd to seven feet	2 2 6	8,228	1371	754 14
	1 2 0	4,840	806	100 16
t	3 0 0	8,712	1452	980 2
ro Row	0 2 0	1,936	322	
Alley	1 2 0	4,840	806	
foot Nabbs	1 2 6	5,280	880	726 0
oot Nabbs	1 1 6	4,356	726	598 19
oal	3 0 0	8,712	1452	
oal coal-beds	84 1 0	99,037		

bove n d of ding coal by the acre rather than a bet results to the landowner and closer l of course a greater yield per acre. commendation.

verage prices of coal and slack

8*s.* 4*d.* in 1880, 7*s.* 8*d.* in 1879, and 9*s.* 3*d.* in 1878.

Highest, 12 6 " 11 8 " " 12 6 "
Lowest, 6 6 " 6 0 " " 8 4 "

Cost of getting coal varied with depth of seam from 2*s.* 6*d.* to 4*s.* 6*d.*

TABLE XLI.—*Nottinghamshire Coal-field.*

Description of Strata.	Thickness. Ft.	Thickness. In.	Depth. Ft.	Depth. In.
1. Limestone magnesian	5	4		
2. Light blue and brown stone in beds	6	3	11	7
3. Blue stone	8	5	20	0
4. Dark-pink bind	3	8	23	8
5. Dark-gray stone	0	4	24	0
6. Red stone with pebbles	1	0	25	0
7. Clunch (usually tough clay or shale)	1	9	26	9
8. Bind	19	0	45	9
9. Ironstone	0	3	46	0
10. Soft clunch	5	0	51	0
11. Black shale or bind	2	7	53	7
12. Clunch	6	8	60	3
13. Bind, with bands of ironstone	40	4	100	7
14. Chillery coal	0	7½	101	2½
15. Light and dark clunch	6	0	107	2½
16. Bind	20	9	127	11½
17. Ironstone	0	2½	128	2
18. Bind	14	7	142	9
19. Soft coal	1	1½	143	10½
20. Shale, bind, and clunch	20	2	164	0½
21. Soft coal	2	4½	166	5
22. Clunch and bind, with bat and shale	18	10	185	3
23. Soft coal	1	0	186	3
24. Clunch and bind	1	0	187	3
25. Soft coal	1	7½	188	10½
26. Clunch and stone	9	5	198	3½
27. Bind, clunch, and stone, with a little coal and ironstone	81	8½	280	0
28. Coal	3	6½	283	6½
29. Dark clunch, with bat and ironstone	20	8	304	2½
30. Coal	0	7	304	9½
31. Shaly bind	10	1	314	10½
32. Soft coal	2	4	317	2½
33. Shale and bind	36	2	353	4½
34. Soft coal	3	4	356	8½
35. Dark clunch, with impressions	3	11	360	7½
36. Soft coal	1	3	361	10½
37. Clunch and bind	45	3	407	1½
38. Coal	1	5	408	6½
39. Black shale and bind	29	7	438	1½
40. Soft coal	2	5	440	6½
41. Shale, clunch, etc.	68	7	509	1½
42. Coal	3	9	512	10½
43. Shale and bind and a few small beds of ironstone	82	3	595	1½
44. Coal (hard)	2	2½	597	4
45. Clunch, bind, and shale	50	0	647	4
46. Main coal	8	2	655	6
15 coal beds, av. size 2 ft. 4½ in.				
Total thickness of coal and strata	655	6		
Total thickness of coal	35	9		
Actual size of beds, from 7½ inches to 8 ft. 2 in.				

Shropshire Coal-field.

		Ft.	In.	Ft.	In.
1. Chance Pennystone coal 2. Fungus coal, 3. Gur coal,	found only at north end of coal-field.				
4. Top coal	From	4	0	to 4	6
5. Half-yard coal				1	6
6. Double coal	"	5	0	" 6	0
7. Yard "	"	2	6	" 3	0
8. Big Flint coal	"	3	0	" 4	6
9. Stinking coal	"	3	0	" 4	0
10. Clunch coal	"	2	0	" 2	0
11. Two-foot and best (with parting)	"	0	0	" 3	4
12. Randle and Clod coal	"	4	0	" 5	0
13. Little Flint coal	"	1	6	" 2	3

10 beds, average thickness 3 ft.; total. 30 ft.

Derbyshire Coal-field.

	Ft.	In.
Sandstones and shales	350	0
1. Coal	2	10
Strata	107	0
2. Coal	2	1
Strata	220	0
3. Barnsley Top hard coal....5 ft. 10 in. to	7	0
Strata, Brown Rake and Black Rake ironstones	470	0
4. Soft coal (generally two seams with partings)	6	0
Strata	120	0
5. Lower hard coal....3 ft. 0 in. to	4	0
Strata	200	0
6. Furnace coal....2 ft. 6 in. to	4	0
Strata with nodular ironstone	140	0
7. Silkstone Clod or black shale coal...5 ft. 0 in. to	7	0
Strata	385	0
8. Kilburn coal....4 ft. 0 in. to	5	0
Strata with honey-crop ironstone	200	0
Wingfield flagstones	350	0
Black shales	300	0
Flagstones and shales	200	0
9. Coal, with a floor of ganister	1	0
Flagstones and shales	125	0
10. Ganister coal (with a floor of ganister)	2	0
Flagstones and shales	600	0
Millstone grit	...	...
Total thickness of coal and strata	3807	11
Total thickness of coal	40	1
Total number of beds, 10.		
Average thickness of beds	4	0

TABLE XLII.—*Great Britain: Iron Furnaces and Coal Consumption.*

Districts.	Furnaces. Built.	Furnaces. In blast.	Pig Iron made, tons.	Coal used, tons.	Average. Per furnace.	Average. Coal used, cwt.
ENGLAND.						
Northumberland	10	4	44,807	101,347	11,202	45
Durham	54	49½	799,573	1,848,100	16,071	40
Yorkshire, North Riding.	78	76	1,156,431	2,643,997	15,216	46
" West "	40	30	151,511	493,976	5,050	65
Derbyshire	47	39	296,468	865,350	7,601	58
Lancashire	44	36	529,271	1,108,192	14,702	42
Cumberland	48	33½	456,877	1,079,118	13,638	47
Shropshire	29	21	135,149	407,876	6,435	60
Staffordshire, North	36	29	241,166	710,856	8,316	59
" South	142	99	673,397	1,968,580	6,801	58
Northamptonshire	16	10	58,480	169,592	5,848	58
Lincolnshire	13	9	52,076	142,236	5,786	55
Gloucestershire	10	6	44,409	134,019	3,841	60
Wiltshire	7	5	48,944	131,293	8,157	53
Somersetshire	1	1				
Total, England	575	448½	4,688,199	11,804,532	10,406	51
NORTH WALES.						
Denbighshire	9	5	42,773	135,180	8,554	63
Flintshire	4	3	24,690	52,098	8,230	42
Total, North Wales	13	8	67,463	187,278	8,433	55
SOUTH WALES.						
Anthracite furnaces	13	8	32,282	81,837	4,102	50
Bituminous Coal-Districts.						
Glamorganshire	73	51	424,384	1,047,245	8,321	49
Monmouthshire	62	42	360,583	867,640	8,085	48
Total, South Wales	148	101	817,789	1,996,722	8,012	50
Scotland	156	126	993,000	2,730,000	7,881	55
Total, Great Britain	892	683½	6,566,451	16,718,532	9,512	50½

North Staffordshire Coal-field.

	Ft.	In.
Peacock coal	6	0
Strata	20	0
Spencroft coal	3	0
Strata	121	0
Great Row coal	8	0
Strata	71	0
Cannel Row coal	5	0
Strata	54	0
Wood Mine coal	2	0
Strata	29	0
Deep Mine coal	2	8
Strata	361	0
Winghay coal	4	0
Strata	377	0
Ash or Rowhurst coal	8	0
Strata	121	0
Burnwood coal	5	0
Strata	66	0
Golden Twist	3	6
Strata	426	0
Mossfield coal	4	7
Strata	30	0
Coal	3	0
Strata	270	0
Birches coal	4	6
Strata	309	0
Ten-foot coal	6	0
Strata	102	0
Bowley Alley coal	4	6
Strata	81	0
Holly Lane coal	5	10
Strata	84	0
Sparrow Batts coal	4	0
Strata	222	0
Flats coal	3	0
Strata	105	0
Frog's Row coal	4	6
Strata	30	0
Cockhead coal	4	6
Strata	420	0
Bullhurst coal	4	0
Strata	60	0
Winpenny coal	3	0
Total thickness of coal and strata	3516	1
Total thickness of coal	101	1
22 coal beds, averaging 4 ft. 7 in. each.		

Leinster Coal-field.

	Ft.	In.
Uppermost beds, about	12	0
Peacock coal	1	10
Strata	45	0
Stony coal	3	0
Strata	21	0
Double seam	5	0
Strata and shales	120	0
Three-foot or Old Colliery coal	3	6
Strata	189	0
Five-foot coal	2	6
Strata		
Upper and Lower Towlerton coals....1 ft. 6 in. to		
Flag series, about		
Black shale series		
Upper Carboniferous limestone		
Total thickness of strata and coal		
Total thickness of coal		

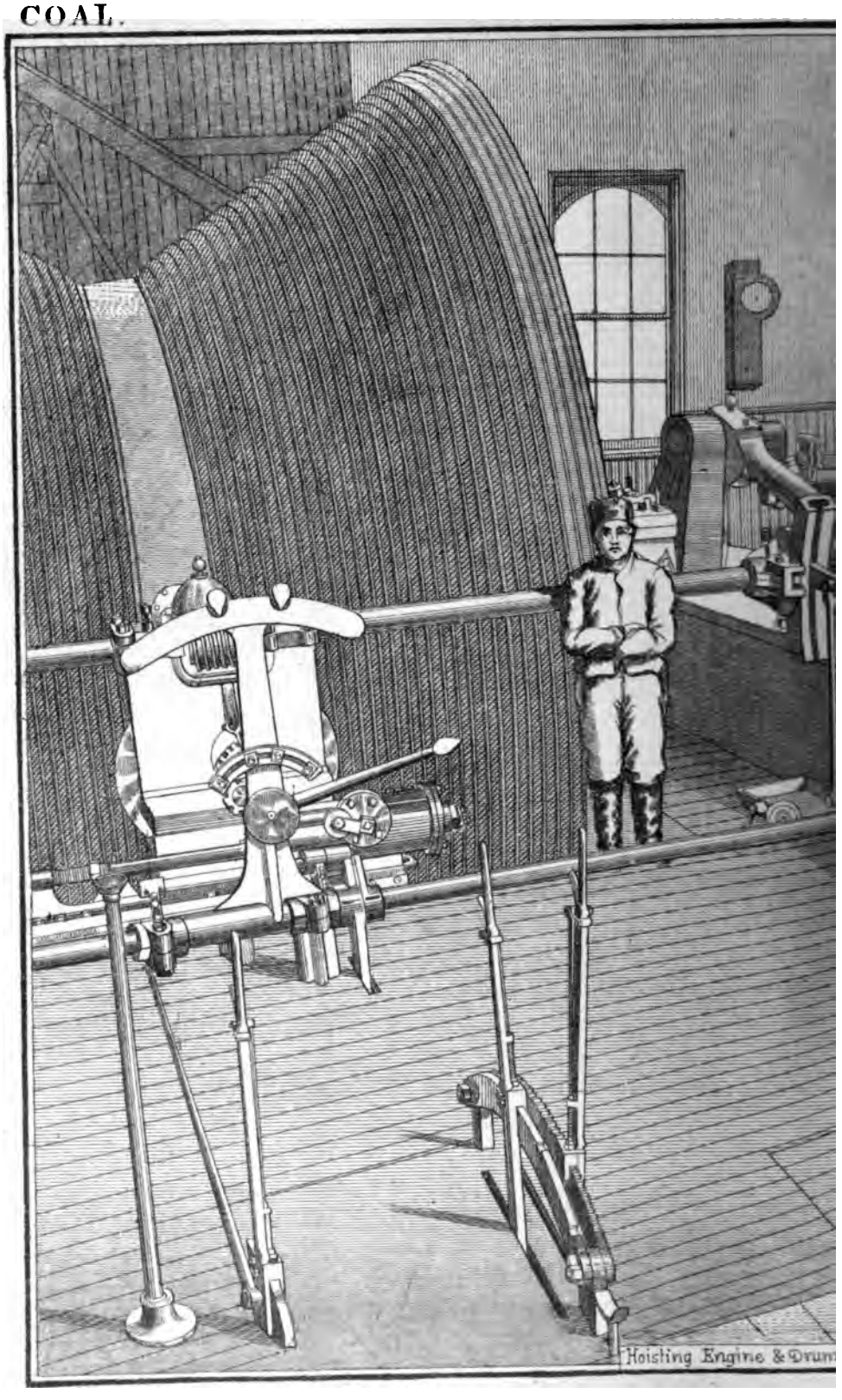

Hoisting Engine & Drum

PLATE XIII.

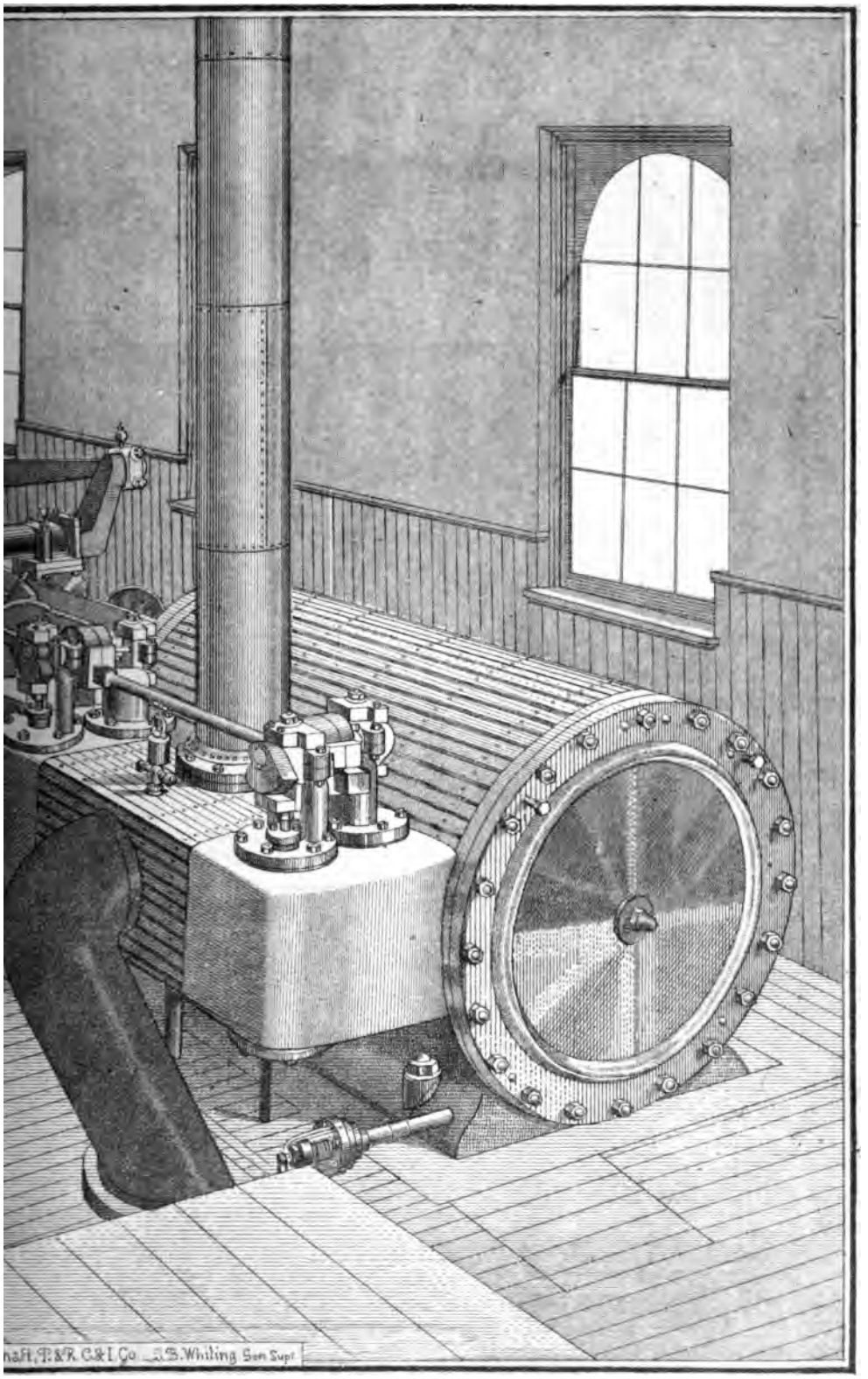


TABLE XLIII.—*Coal Statistics of Ireland.*

Year	Collieries.								Total Coal raised.	Average per Man.	Persons Employed.		
	Connaught.		Ulster.		Leinster.		Munster.				Under Ground.	Above Ground.	Total.
	Colls.	Tons.	Colls.	Tons.	Colls.	Tons.	Colls.	Tons.					
1873	376	11,021	391	18,105	777	61,425	406	45,180	135,731	79	1209	741	1,950
1874	111	5,108	321	17,810	828	73,302	391	43,993	139,213	84	1120	531	1,651
1875	84	4,772	261	15,869	866	66,876	333	40,684	128,207	83	1069	475	1,544
1876	99	5,203	183	15,365	798	72,025	285	32,632	125,195	90	946	419	1,365
1877	78	6,477	180	15,398	713	88,095	277	30,211	140,181	112	883	365	1,248
1878	75	6,456	217	12,407	663	74,474	267	28,714	122,051	100	841	381	1,222
1879	88	9,600	165	17,066	624	77,061	238	25,276	129,003	115	819	296	1,115
1880	87	8,506	175	21,203	589	75,490	220	28,503	133,702	124	777	294	1,071
Totals..	998	57,143	1893	133,193	5858	588,748	2417	275,193	1,053,283	787	7664	3502	11,166

***Coal-Series of Northumberland and Durham, Newcastle District** [by Prof. Hull, F. R. S.].*

	Ft.	In.
Closing Hill seam	1	8
Strata	450	0
Hebburn Fell seam	2	8
Strata	250	0
Five-quarter seam	4	0
Strata	260	0
Three-quarter (Black Close) seam	2	0
Strata	50 to 180	0
High Main coal	6	0
Strata	33 to 150	0
Metal coal	1	6
Strata	33	0
Stone coal	1	6
Strata	60 to 100	0
Yard coal (variable)	2	10
Strata	60 to 100	0
Bensham coal	2 ft. 5 in. to	5 0
Strata	78	0
Five-quarter coal	3	0
Strata	48	0
Low Main or Hutton coal	6	0
Strata	30 to 100	0
Crow coal (inconstant)	2	10
Strata	24	0
Five-quarter coal	3	8
Strata	30	0
Ruler coal	1	10
Strata	96	0
Townley or Harvey coal	3	1
Strata	42	0
Jetty coal	2	2
Strata	42	0
Stone coal	2	5
Strata	18	0
Five-quarter coal	3	0
Strata	30	0
Three-quarter coal	2	6
Strata	54	0
Brockwell coal	2	11
Total thickness of coal and strata	2145	7
Total thickness of coal	60	7

20 beds, averaging 3 ft. each.
Regular size of beds, from 1 ft. 6 in. to 6 ft.

Population employed in Coal-mining in the United Kingdom.—All the early returns on this subject were reful mates made by the inspectors, each in his m ict. Since 1872, when the Coal-mines Regu- act came into operation, very complete returns been published in the annual reports of H. M. rs of mines, in which the numbers engaged above ground are separately distinguished, with the quantity of coal raised. These ap- ne and ted table, to which is added the aver- man in each year:

TABLE XLIV.

Year.	Persons Employed.		Total.	Coal Raised.	Average per Man.
	Under Ground.	Above Ground.			
				Tons.	Tons.
1873	407,808	106,341	514,149	128,680,131	250
1874	428,611	110,218	538,829	126,590,108	235
1875	427,017	108,828	535,845	133,306,485	245
1876	409,229	105,303	514,532	134,125,166	266
1877	395,025	99,366	494,391	134,179,968	273
1878	382,979	92,350	475,329	132,612,063	279
1879	385,179	91,631	476,810	132,720,393	280
1880	391,381	93,552	484,933	146,969,409	303
1881	399,387	96,090	495,477	154,184,300	311

These figures indicate the increased efficiency of the coal-miner in recent years. In 1873, the year of the "coal famine," the average output per man was 250 tons per annum. A less number of persons was then employed than in the succeeding year, when the average fell to 235 tons per man, the diminished production being due to the larger amount of unskilled labor employed. Since 1874, however, the efficiency of the coal-miner has gone on increasing, till in 1879 the average amounted to 280 tons, and in 1880 to 303 tons, per man per annum.

Of the population employed in coal-mining the annexed abstract will show the numbers and respective ages of all engaged under and above ground in the collieries of the United Kingdom in the year 1873, when the last return appeared, and for the years 1879 and 1880; the last-named year showing an increase of 8123 persons employed in excess of the previous year, and an increase of 23 tons per man:

TABLE XLV.

Ages.	1873. Persons Employed.	1879. Persons Employed.	1880. Persons Employed.
Under ground.			
From 10 to 12	1,202	446	428
" 12 to 13	11,309	4,881	4,868
" 13 to 16	45,931	35,993	36,162
Above 16	349,366	343,859	349,923
Above ground.			
Males, 10 to 13	2,070	671	552
Females, 10 to 13	31	9	10
Males, 13 to 16	6,957	6,572	7,037
Females, 13 to 16	790	502	354
Males above 16	91,110	79,546	81,323
Females above 16	5,383	4,331	4,276
Total	514,149	476,810	484,933

To realize the great importance of coal in the world's progress we have but to quote from the very complete records of Robert Hunt, F. R. S., keeper of mining records for the year 1880, the result of one year's working in the kingdom of Great Britain and Ireland:

Value of the product of gold and silver	£2,717
" " " " iron ore	6,585,806
" " " " tin, copper, lead, zinc..	1,778,723
" " " " clay, salt, ochre, gypsum, nickel, pyrites..	3,331,879
	£11,699,125
Value of the coal-product for the year, or 84·3 per cent. of the whole	£62,395,414
In all	£74,094,639

Well may Prof. Tyndall say the seat of England's greatness is in her coal-mines. The weight of this gross product is nearly 171,000,000 tons, and of this the great bulk is coal.

Of this vast product, England, from her 17 counties and 2720 collieries, mined....	109,749,367 tons.
Wales, from her 7 counties and 451 collieries, mined	18,660,550 "
Scotland, from her 7 counties and 651 collieries, mined	18,274,886 "
Ireland, from her 5 counties and 50 collieries, mined	133,719 "
	146,818,622 tons.

The amount exported to all the world—not including that sent to Ireland—was 17,703,787 tons; declared value, £8,372,933. It went principally to France, Germany, Italy, Russia, India, and Egypt (see Table XLVI.); the amount landed on the Atlantic coast of this country being 83,652 tons, and on the Pacific, 84,135 = 167,787 tons—only one-sixth of a million out of 146 millions. This simple fact shows that the coal-areas of the United States make us practically independent. Of the 130 million tons of coal not exported, Great Britain consumed in her 892 furnaces (but 683 of which were in blast) 16,718,532 tons to make 6,566,451 tons of pig iron. (See Table XLII.) Great Britain thus shipped but one-tenth of her product, and consumed nine-tenths to supply home industry and keep her people at work. There were brought by rail, canal, and sea to the London district alone, in 1880, 9,915,489 tons.

The coal export of Great Britain and Ireland had increased by 1887 to 24,460,967 tons, the total product of the mines for that year being 162,119,812 tons, and for the year 1888, 169,935,219 tons. The total number of persons employed in the mines was 526,277. The yield of the iron mines for 1880, as compared with the coal, was as follows: coal, 146,818,622 tons; iron ore, 11,664,726 tons.

And another comparative statement will show how the coal-production has kept pace with the population:

	Population.		Tons.
1800, G Britain and Ireland,	16,000,000		10,080,300
1850, " "	28,000,000	(1854)	64,661,401
1875, " "	33,060,000		131,867,105
1881, " "	35,246,000		154,184,300

TABLE XLVI.—*Coal Exported from Great Britain to Other Countries in 1880 [from Gen. Report].*

Countries.	
Argentine Republic	
China and Hong-Kong	
Belgium	
Central American States	
Brazil	12
Chili	17
Denmark	
Channel Islands	
France	1
Falkland Islands	
Foreign West Indies	
West Coast of Africa	
Muscat and Bourbon	
Mauritius and Madagascar	
Greece and Roumania	
Germany	1
Sweden	
Holland	
Norway	
Pacific Islands	
Austrian Territory	
Russia—North and South	1
Gibraltar	
Malta	
United States of America	
Nova Scotia, New Brunswick, etc.	
British India and Straits Settlements	
Philippine Islands, India, and Siam	
British West Indies	
Java	
Ceylon	
Dutch Possessions	2
British Possessions in Africa	17
Tripoli, Tunis, etc.	
British Australia	
Italy	1
Japan	
Ecuador	
Mexico	2
Peru	4
Uruguay	12
Azores	33
Bolivia	1
Spain	
Egypt	
Aden	
Algeria	
Turkey	
Venezuela	
United States of Colombia	11
Cinders and patent fuel	
Total	15,
Total value	£8,37
Iron ore imported in 1880	2,
Coal used in pig-iron manufacture in 1880	16,
Ore produced in Great Britain in 1880	18,
Total value	1

Coal under London.—A ridge of Palæozoic r has been found underlying the city of London, ha been reached at Tottenham Courtyard at a de

TABLE XLVII.—*Analyses of Russian Coals, Series I. to IX.*

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
Volatile matter	.....	8·12	5·84	7·67	7·96	5·73	7·76	6·61	5·43
Fixed carbon	.....	86·68	91·91	88·89	89·22	91·73	90·13	88·93	90·39
Ash	.....	5·20	2·25	3·44	2·82	3·53	2·11	4·46	4·19
	.....	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Sulphur	.....	.....	2·89	1·297	2·52	1·50	1·06	0·994	1·09

1066 feet. Authorities quoted in *Nature* declare that there is a reasonable probability of finding "a

dense anthracite" in these rocks, in which case the city can be supplied with the best variety of fuel at a very moderate cost.

RUSSIA.—At the Centennial Exhibition at Philadelphia in 1876 the mining department of Russia exhibited a series of anthracite coals from the government of Ekaterinoslav, which is situated just north of the Sea of Azof. This series (see Table XLVII.) was taken from the following localities:

I. Anthracite from the estate of Mr. Bulazel.

II. Anthracite from the left bank of the river Cundrutchja; bed, 2 feet 4 inches.

III. Anthracite from the ravine Shirokaja, on the river Krinka, near the village of Charziskaja; bed, 4 feet 1 inch thick.

IV. Anthracite from the ravine Philipowa, near the village of Tchisjakowa; bed, 4 feet 1 inch thick.

V. Anthracite from the ravine Perivi Iar, on the river Olchowaja, near the village of Olawa; bed, 4 feet 1 inch thick.

VI. Anthracite from the ravine Pogorelaja, on the river Sowostjanka; bed, 2 feet 1 inch thick.

VII. Anthracite from the ravine Wodjanaja, on the river Chrustatnaja.

VIII. Anthracite near the village of Malokrepinskoi; bed, 3 feet 6 inches.

IX. Anthracite from the ravine Librinaja, near the village of Rowence; bed, 4 feet 1 inch thick.

A much larger suite of coals, from the most southern province of Russia (the government of Taurida), was exhibited, the analyses of which show that the greater portion of them are semi-bituminous. As is seen from the analyses, they are all very low in sulphur and ash, appear to be of a good quality, and are well adapted for iron-smelting:

	I.	II.	III.	IV.
Volatile matter...	12·64	37·95	16·50	29·00
Fixed carbon.....	86·04	61·21	82·63	61·92
Ash.....	1·32	0·84	0·87	1·08
	100·00	100·00	100·00	100·00
Sulphur.....	0·80	0·35	0·24	0·36

The official reports of the Russian department of mines show the following output of coal in that country for the years named:

	Pounds.	Net tons.
1874.....	78,813,137	1,423,245
1875.....	104,348,067	1,884,313
1876.....	111,302,028	2,009,941
1877.....	110,120,054	1,988,547
1878.....	154,024,302	2,781,363
1879.....	178,238,013	3,218,661

The great increase of the output is owing to the increased productiveness of the mines of the Don basin, of Poland, and of the Moscow basin. In ten years the yield of coal has almost quadrupled in Poland, but this production is not sufficient for the local demand, which must be met by the Silesian coal. A projected railway from Dombrovad to Ivangorod will, it is thought, greatly increase the coal-yield.

The narrative of the *Voyage of the Vega*, in 1879, by Prof. Nordenskjöld, refers to the discoveries on Bear Island and the coast of Spitzbergen of considerable strata of coal and phosphatic minerals, which are likely to be of great economic importance to neighboring countries. Also in Northern Siberia, about 70° N. lat., near where the river Dudinka flows into the river Yeniesei, in the Noril Mountains, there are very thick coal-seams. This must prove of vast importance for steam-navigation on the great rivers of Northern Russia and Siberia, the Obi and Yeniesei, which are navigable for 1000 miles or more in the interior of Siberia, and even into China.

Coal of poor quality has also been found on the Lena River at Schiganth, on the Arctic Circle, north of Yakutsk.

COAL-FIELDS OF TURKEY.—At about 150 miles from the mouth of the Bosphorus, on the Asiatic coast of the Black Sea, there is a coal-basin of considerable extent and richness, which, when properly worked, will exercise a large influence on the future prosperity and civilization of the Ottoman empire. This coal-field is known as the Heraclea basin, and is near the Heraclea Pontica of the ancients. The first report on it was made in 1854 by two French engineers, but it was not complete, as they were not furnished with the means of making a thorough exploration. Since then much more complete surveys have been made, which show that the coal-beds extend over an area of about 450 square miles, and are estimated to contain 60,000,000 tons. During the Crimean War, the British Government obtained permission from the Porte to work these mines to supply the Allied squadrons operating against Sebastopol and their numerous steam-transports, and the works undertaken in the mountains south of Zongal Dagh, 60 miles east of Heraclea, furnished nearly all the coal consumed during the siege. After the conclusion of peace it was no longer to the interest of the English to continue working these mines, whose development would have created a serious competition with their own coals, which now find so large an outlet in the East. After 1856 the working of the mines was left to the Ottoman Government, and it has been conducted ever since in the careless manner that characterizes every work of public utility in Turkey which is under the supervision of the Government.

The best quality of coal is obtained at Kooslor, in the district of Heraclea, where it is found in seams varying from 3 to 18 feet in thickness. The mines are the property of the Government, and in 1880 were estimated to have yielded about 33,000 tons, all of which were used by the vessels of the imperial navy and the Government factories. The cost of this coal, delivered at Constantinople, is now about $4.08 per ton, but with proper mining and means of transport it could easily be obtained for much less. Other beds are found throughout this district, but none of them are yet mined; the only other mine being that of Sokia, where about 5000 tons of lignite are extracted annually. On the other hand, Turkey is compelled to import largely from abroad.

The following table shows the import of English coals into Constantinople during the past six years:

In 1875.....	129,625 tons.
" 1876.....	213,249 "
" 1877.....	145,253 "
" 1878.....	260,766 "
" 1879.....	198,523 "
" 1880.....	207,579 "
Total.....	1,204,935 tons.

The freight on the above averaged about $3.72 per ton.

COAL IN AFRICA.—Northern Africa has but little coal that has been discovered beyond doubt. Some eminent geologists, commissioned by the French Government, report the presence of coal in Algeria, in the more remote parts of the colony. In a paper read Oct. 25, 1882, by M. Pinard, before the French Academy of Sciences, an account is given of bituminous coal-deposits near Bou Saada. He claimed that it fully equalled the

coals of France and England in illuminating power, and furnished a coke ranging from 62 to 66 per cent. of the weight of the coal itself. At Smeudon, in the province of Constantine, lignite has been found in the Tertiary beds, but they have not exhibited satisfactory results. At Coleah similar lignites are found.

Egypt.—Several beds of coal have been found in the oasis of Ghenne in Egypt, on the Arabic side of the Thebaïd. It resembles the Scotch coal. In Nubia coal is reported to have been discovered.

Tropical Africa.—Sir W. C. Harris, in his *Highlands of Ethiopia*, says that coal-beds extend along the whole of the eastern frontier of Shoa. Coal is also reported to be found in the more remote parts of Abyssinia. Dr. Livingstone, in his *Expeditions to the Zambesi*, says coal-deposits occur on the banks of the Zambesi River. Some seams exist in the island of Madagascar. At Quilimané, in the Portuguese settlement of Mozambique, some valuable coal-seams are reported to have been discovered.

Southern Africa contains the only valuable and productive coal-mines of the continent. In the Stormberg, on the north-east margin, north of Queenstown, occur two sets of coal-bearing beds: one is probably of old Carboniferous age; the other belongs to the upper part of the great Karoo series. There is an exposure of some underlying coal-bearing (anthracitic) strata, distinct from the Karoo beds, at Buffel's Kloof, in a spur of the Camdebo Mountains, between Graaf Reinet and Beaufort West. Again, outcrops are seen at Brandewyn's Gap, by the Leeuwe River, on a spur of the Nieuweldt, 36 miles north-west of Beaufort West and 100 miles west of Buffel's Kloof.

At Buffel's Kloof the diggings show that one or more rather thick seams of coal (anthracite) in underlying inclined beds have been broken and crushed by fault.

In Natal the coal is of better quality than the Stormberg. In the Biggarsberg there is a seam of coal 8 feet thick. In the Transvaal, equally thick seams of superior coal are known in the High Veldt. A few outcrops are known in the Orange Free State. Mr. Stone, F. G. S., in his report on the Sand River district, says the coal underlying that portion of the country would amount to 145,800,000 tons. In the new coal-field discovered in the Vaal River Valley the minimum quantity would be some 350,000,000 tons, making a total of 495,800,000 tons.

The *Port Elizabeth Telegraph*, published at the Cape of Good Hope, says that Mr. Frederick W. North, C. E., who has for some time been engaged in exploring the coal-measures of South Africa, has lately thoroughly inspected all the best-known and most promising coal-mines of Natal, and carefully tested the coal on the Natal railroads. "Though not equal to the article imported from England, he finds it well suited for railroad purposes, and much superior to Indian coal, which he had an opportunity of using for comparison. He says, as the result of his observations, that 13½ cwt. of good English coal will do the same amount of work as 17 cwt. of Natal coal; but, estimating the cost of English coal at Durban at £3 per ton, and the cost of Natal coal at the mines at 12*s.* 6*d.* per ton, a very great saving will be effected by using the latter. The principal mines are at Dundee, New Castle, and Sunday River. A capital mine could be opened within fifteen miles of Ladysmith." Preparations are being made to open up these coal-deposits and place them in communication with both the coast and the diamond-fields by rail.

In 1880, Great Britain shipped coal to points in Africa as follows:

	Coals, tons.	Cinders, tons.	Pat. Fuel, tons.	Value £
Egypt	649,327	296	2,946	316,000
Tripoli and Tunis	3,308	...	...	1,482
Algeria	46,182	3	39,213	39,250
Morocco	51	...	230	132
Western coast	124,474	...	2,386	63,679
British possessions in South Africa.	168,289	479	6	86,765
Eastern coast	9,649	...	1,565	6,595
Total	1,001,280	778	45,646	513,900

Pres. Benson, of the Republic of Liberia, in his message of 1863 (page 78), mentions a rich quality of coal at Half Cape Mount. Also a rich quality of iron ore in the vicinity of Careysburg.

NEW ZEALAND.—The first mention of coal in this colony was made in 1839, when imperfectly formed coal was found. In 1849 coal was found on the banks of the Tangarakaw, in the province of Wellington. Coal was also discovered at Motupipi in 1840. In 1858 the first systematic efforts to develop the coal-mines were made in the Drury district, 24 miles from Auckland. In 1863 coal was discovered on the Waikato River, 90 miles from its mouth. The seams vary from 18 to 55 feet in thickness. The coal is a brown coal of Tertiary age, and the seams are overlaid by beds of limestone. Brown coal is also found near the Malvern Hills, 30 miles from Christchurch, and a vast area extends under the Canterbury plains. It is also found near the Molyneux River, where the seams are from 6 to 20 feet thick. At one place a section is exposed 3 miles in length and 56 feet thick. An estimate places the amount of accessible coal in this district at 100,000,000 tons. Some mines are successfully worked. Within 6 miles of Dunedin is an important basin called the Green Island and Saddle Hill. Two of the seams are, respectively, 7 and 9 feet thick, and successfully worked. There is an area of 10 square miles near Green Island containing a seam 18 feet thick. Only 6 feet are worked, however, as the roof is soft and timber is not plentiful for support; so two-thirds of the coal is lost. Another great area of brown coal is found on the western seaboard of Otago, east of the Kakamii Mountains. At Kartangata there is a field of 40 square miles. The seams here are 27 feet thick, and the coal is good, having a hard, splintery fracture and laminated structure.

The *black* or *pitch coal* covers large areas in the districts of Auckland, Nelson, Canterbury, and Otago. The coal belongs to the Mesozoic age. A pure seam is opened 70 miles north of Auckland, and another seam on the Kawakawa River. The diamond drill has been used in the developments, and shows the existence of several other beds. The Bay of Islands Coal Company has the largest mines. The coal is hoisted, and then hauled to, and loaded into, steamships, and shipped to San Francisco and other points. An analysis of the coal is given below.

Coal is also mined at the Kamo colliery, 25 miles distant. It is thought that these seams are the same, and that others exist near them, showing one vast bed between Kamo and Kawakawa. The seams at present worked are 11 feet thick. The color of the coal is black, lustre resinous, fracture and cleavage irregular and granular.

Analyses.

	Bay of Islands.	Kamo.
Fixed carbon	57·20	56·9
Volatile matter	36·00	39·75
Moisture	4·60	2·44
Ash	2·20	0·61
Sulphur	...	1·29

The coal-mines of the South Island exceed those of the North Island in number, but are generally smaller. The seams are thick, but have not been worked to their greatest extent. The production of coal at all the mines, and the importation of all coal to New Zealand, are given:

	Raised in colony.	Imported.
1878	162,218 tons.	174,145 tons.
1879	231,218 "	158,076 "
1880	299,923 "	123,296 "

The c of coal is $2.44 at New Castle: freight to F co is $3.32; price in San Francisco is $6.75.

coal lds of the Mokau district have been ex- d by Mr. Hector, who reports that the coal-forma- here is of considerable extent, the outcrops hav- a width of two miles and stretching from Kawhia or toward the upper part of the Wanganui River. eds appearing on the Mokau River are from 2 to thickness, and the coal is excellent for steam Limestone also abounds in this district, and of brown hæmatite iron ore 50 feet thick has for a distance of two miles.

FROM FOREIGN COAL-FIELDS.—The follow- ements concerning other European coal-fields their product are principally taken from the States consular reports:

Russia.—The consumption of coal by railways, manufactories, and steamers amounts to 1,500,000 tons, of which 600,000 tons are brought from Europe and Asia, and the rest mined in the country.

France.—Coal Production, 1885..... 19,511,000 tons.
" " 1886..... 19,900,000 "
" " 1887..... 21,403,049 "
" " 1888..... 22,951,940 "
" " 1889..... 24,585,880 "

TABLE XLVIII.—*Imports and Exports of Coal and Coke.*

	Coal.		Coke.	
	Imports.	Exports.	Imports.	Exports.
1879	7,662,385	513,938	760,529	20,559
1880	8,451,129	546,455	943,416	40,905
1881	8,106,761	724,885	1,110,974	24,514

For the year 1880 the consumption of coal in France was distributed as follows, according to *La Houille:*

Railroads	2,499,000, or	9·6 per cent.
Ocean steamers	450,000 "	1·8 "
River steamers	112,000 "	0·4 "
Mines	1,112,000 "	4·4 "
Other industries	3,819,000 "	15·1 "
Iron and steel works	4,546,000 "	17·9 "
Other metallurgical works	141,000 "	0·6 "
Salt-works	115,000 "	0·5 "
Domestic fuel	12,606,000 "	49·7 "

Germany.—The information contained in Tables XLIX., L., LII., and LIII., obtained from official reports of the Government, is of importance on account of the high rank of Germany among the coal-producing countries.

Breslau.—The official report concerning the coal and metal industries of Upper Silesia for the year 1880 gives some interesting statistics. It appears that women and children are still employed in large numbers in the mines and smelting-works of that district. The 88 coal-mines of the district produced in that year 10,010,721 tons of coal, and gave employment to 32,517 persons, of whom 2580 were of the female sex. The mines likewise found work for 962 horses, and for 462 steam-engines of 36,356 horse-power. The 32,517 laborers were paid, in all, $4,075,761, or $125 per head.

The following table gives the number of persons employed in the mines in Upper Silesia, their age, sex, and aggregate wages:

TABLE XLIX.

Sixteen years and upward.		Under sixteen years.		Wages.
Males.	Females.	Males.	Females.	
29,865	2,567	78	13	$4,065,671

Coal and Lignite in Prussia.—Of the countries in Europe, Prussia is next to England in its coal-production, and ranks third among the coal-producing countries in the world. During the year 1881, 43,780,545 tons of coal were raised, in addition to 10,412,153 tons of lignite. In 1880 the total production of coal in Germany was 67,341,339 tons, and that of lignite 17,551,411 tons.

TABLE L.—*Production of Mines in the German Empire and Luxembourg during 1881.*

BITUMINOUS COAL.

States, subdivided into Mining Districts.	Mines reporting for 1881.			
	Production in 1881.		Production in 1880.	
	Tons, 1000 kilos, 2214 lbs.	Value, Marks.	Tons, 2214 lbs.	Value, Marks.
I. Prussia—Breslau district	13,110,848	58,977,591	12,656,764	57,186,702
Halle "	29,657	273,157	35,114	313,328
Dortmund "	23,644,755	108,243,307	22,495,204	102,953,856
Bonn "	6,698,623	40,983,021	6,627,551	47,551,451
Klausthal "	396,662	2,716,525	358,328	2,611,669
Total Prussia	43,780,545	216,973,961	42,172,914	210,617,006
II. Bavaria—Munich district	290,496	2,606,962	320,720	2,858,930
Bayreuth "	53,951	416,914	52,601	391,988
Zweibrücken	175,475	1,417,776	183,135	1,528,932
Total Bavaria	519,922	4,441,652	556,256	4,779,850
III. Saxony[1]	3,717,368	25,994,961	3,621,018	25,389,641
IV. Baden	9,330	90,965	10,965	106,537
V. Saxe-Meiningen	819	7,189	2,892	23,071
VI. Saxe-Coburg-Gotha	108	2,223	152	3,110
VII. Schaumburg-Lippe	108,965	965,555	100,160	918,855
VIII. Alsace-Lorraine	560,957	4,106,698	508,998	3,808,729
Total German	45,697,754	252,492,324	46,972,262	245,657,178

BROWN COAL.

States, subdivided into Mining Districts.	Mines reporting in 1881.				Not reporting in 1881.	
	Production, 1881.		Production, 1880.		Production, 1880.	
	Tons.	Value, Marks.	Tons.	Value, Marks.	Tons.	Value, Marks.
I. Prussia—Breslau district	462,963	1,599,692	446,526	1,575,189		
Halle "	9,574,507	28,296,892	9,127,570	27,397,444	4,219	9,049
Bonn "	223,076	697,866	159,582	552,182		
Klausthal "	149,180	647,681	136,191	631,911		
Total Prussia	10,409,746	31,242,131	9,869,869	30,156,726	4,219	9,049
II. Bavaria—Munich district	1,884	11,004	2,409	14,312		
Regensburg "	15,256	52,694	13,543	51,978		
Bayreuth "	...	...	...	...	141	949
Zweibrücken	1,000	3,500	1,250	4,250		
Total Bavaria	18,140	67,198	17,202	70,540	141	949
III. Saxony	592,895	1,735,421	586,090	1,858,092	4,029	10,246
IV. Hesse	30,738	238,153	45,351	326,600		
V. Mecklenburg-Schwerin	12,341	46,050	11,900	59,500		
VI. Saxe-Weimar	257	1,683	431	2,834		
VII. Braunschweig	273,683	891,694	234,854	793,443		
VIII. Saxe-Altenburg	682,864	1,776,704	657,549	1,169,087		
IX. Anhalt	766,137	2,350,456	659,911	2,083,580		
X. Schwarzburg-Rudolstadt	47,050	161,315	41,824	143,397		
XI. Reuss (younger line)	5,070	10,135	7,015	16,530		
XII. Alsace-Lorraine. Alsace	3,206	10,831	3,284	9,458		
Total German Empire	12,842,127	38,531,771	12,135,280	36,689,787	8,389	20,224

[1] Collieries producing 1304 tons, valued at 7738 marks, in 1880, not reporting in 1881.

TABLE LI.—*Analyses of Foreign Coals* [from Kerl's *Metallurgy*].

Name of Coal and Country.	Fixed carbon.	Hydrogen.	Nitrogen.	Sulphur.	Oxygen.	Ash.
BORNEO.						
Labuan	64·52	4·74	0·80	1·45	20·75	7·74
Three-feet seam	54·30	5·03	0·98	1·14	24·22	14·32
Eleven-feet seam	70·31	5·41	0·67	1·17	19·19	3·23
VAN DIEMEN'S LAND.						
Fingal	57·21	3·58	1·20	1·32	7·80	29·09
Tasman's Peninsula	65·54	3·36	1·91	1·03	1·75	26·41
Whale's Head	65·86	3·18	1·12	1·14	7·20	21·50
Adventure Bay	80·22	3·05	1·36	1·90	4·80	8·67
Sydney	82·39	5·32	1·23	0·70	8·32	2·04
Formosa	78·26	5·70	0·64	0·49	10·95	3·96
Vancouver's Island	66·93	5·32	1·92	2·20	8·70	15·83
Conception Bay	70·55	5·76	0·95	1·98	13·24	7·52
Trinidad	65·20	4·25	1·33	0·69	21·69	6·84
Dresden	80·40	4·60	0·11	...	14·60	
France	85·00	4·88	...	...	4·53	7·00
		Vol. matter.				
Nova Scotia, Pictou	60·73	26·76	...	...	...	12·51
Cape Breton, Sydney	67·57	26·93	...	...	...	5·50
Isle of Cuba	34·97	63·00	...	...	...	2·03

Name of Coal and Country.	Fixed carbon.	Vol. matter.	Nitrogen.	Sulphur.	Oxygen.	Ash.
SPAIN.						
Coals of Asturias:						
One-yard coal	66·00	31·80	...	...	...	2·20
Three-yard coal	67·90	30·90	...	...	...	2·10
Mine of Clausel	35·00	53·00	...	...	...	12·00
Mean of five other mines	53·00	40·00	...	...	...	7·00
BELGIUM.						
Near Mons	65·30	33·00	...	...	...	1·70
Liége	78·30	17·80	...	...	...	3·90
Bonnier	91·38	8·00	...	...	...	0·62
ASIA.						
Assam	60·70	38·50	...	...	...	0·80
Birmese coast	33·00	66·40	...	...	...	0·60
Turkey in Asia	62·40	31·80	...	...	...	5·80
Syria	14·00	72·60	...	...	...	13·40
"	24·40	68·00	...	...	...	7·60
ITALY.						
Principality of Monaco.	49·20	29·90	...	...	...	20·90
EUROPEAN CONTINENT.						
Mean analysis of twelve varieties of anthracite.	79·15	7·37	...	...	...	13·48

TABLE LII.—*Statement showing the Quantities and Values of the Product of German Mines in the Years 1871 to 1880.*

Year.	Pit Coal.		Brown Coal.	
1871	646,212 cwt.	$51,968	186,021 cwt.	$6239
1872	732,740	70,607	198,396	7020
1873	800,630	96,068	214,563	8242
1874	790,209	92,150	236,269	9337
1875	823,600	70,701	228,089	8779
1876	845,996	62,755	244,112	9149
1877	825,651	51,639	235,406	8552
1878	870,975	49,484	240,462	8111
1879	924,565	48,957	451,790	8356
1880	1,034,047	58,567	267,264	8754

TABLE LIII.—*Prices of Pit Coal (Average in 1880 and 1879) in Several German Cities.*

Cities.	Marks per 1000 kg. (= 22 cwt.)	
	1880.	1879.
Berlin	7·04–4·52	3·80–4·04
Breslau	1·42–2·38	1·42–2·33
Dantzig	3·09–3·33	2·85–3·09
Dortmund	1·42–1·90	1·19–1·90
Düsseldorf	1·42–1·90	1·19–1·42
Essen	1·42–1·66	0·95–1·19
Hamburg	3·33–3·80	3·57–3·80

Sweden and Norway.—The output of coal in Norway and Sweden in 1881 was very nearly 97,684 tons. This coal is all mined in the extreme south of Sweden, chiefly at Höganäs and vicinity; it is very hard, and requires a very strong draught; it has not, as yet, been successfully employed for smelting purposes, its chief

COAL

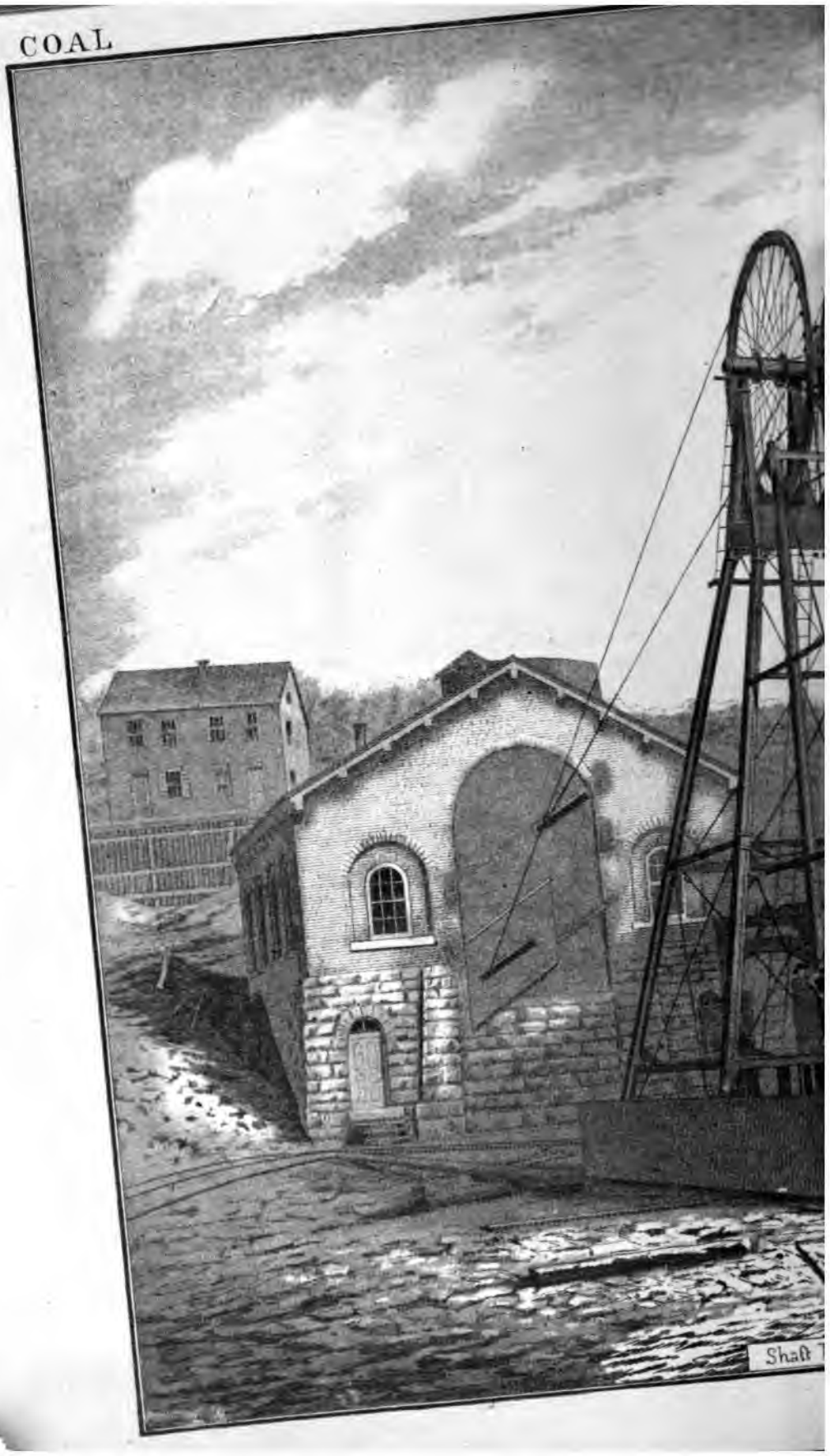
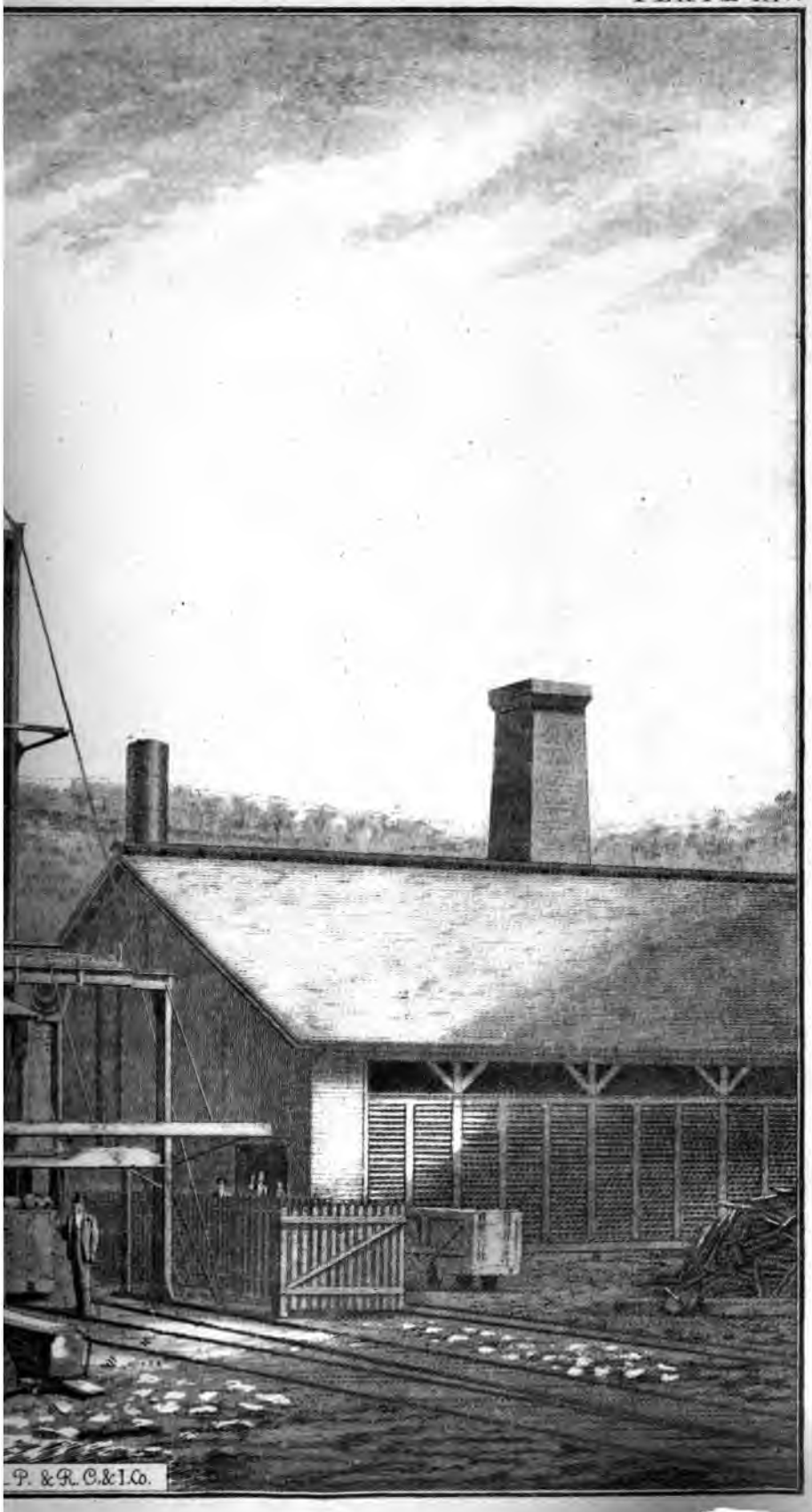


PLATE XIV.



present, being for locomotives and factory-engines, sells in the market at about the price of Scotch ...ally about 2s. less than Newcastle coal. ... 1881 is by far the largest ever reported, ... coal has been mined since 1797. Two seams ... worked, one at a depth varying, according to ... dip, from 30 to 60 metres (33½ to 66½ yards), and 15 to 44 centimetres (6 to 1... inches) thick, and the other 24 metres (nearly 79 feet) lower, 1·42 metres (4 feet 8 inches) thick. Swedish engineers acknowledge that they are not thoroughly acquainted with the extent of this coal-formation, though numerous bore-holes have been put down and shafts sunk. The measures contain coal of inferior quality, as well as fire-clay.

LIV.—*Statement showing the Domestic Exports of Coal from the several Custom Districts of the United States for the years ended June 30, 1880 and 1881.* [*Specially furnished by the U. S. Census Bureau.*]

Customs Districts.	Year ended June 30, 1881.				Year ended June 30, 1880.			
	Anthracite.		Bituminous.		Anthracite.		Bituminous.	
	Tons.	Dollars.	Tons.	Dollars.	Tons.	Dollars.	Tons.	Dollars.
...Va	7	44	90	360				
...	...	...	29,079	114,365	22	114	44,888	152,058
an... ...arlestown, Mass	4,244	23,071	...	...	1,260	6,748	309	1,503
and R. I	71	500						
Creek	5,293	24,559	266	692	6,504	19,459	406	661
lain, N. ...	81,146	361,285	...	...	47,926	159,065		
ga, Ohio	...	...	69,710	222,683	...	...	103,190	267,831
re, Del	...	...	30	120	...	...	100	350
, Mich	27,158	167,923	...	...	22,366	110,807	50	250
, Minn	...	...	...	...	...	...	2	11
k, N. Y	...	...	...	...	4	20		
a	...	...	5,103	15,283	6	24	6,473	18,396
ld, Conn	...	...	...	...	55	182		
e, N. Y	28,061	130,549	199	828	20,673	65,517	406	1,360
town, D. C	...	...	800	2,800	...	...	6,285	20,039
Mich	...	...	15,931	79,135	...	...	3,091	14,102
	122	537	...	...	3	12		
	...	...	7,032	23,311	...	...	11,819	34,546
	...	...	2,424	22,647	712	4,505	68	334
	...	...	...	...	...	...	40	180
J	1,159	5,109	...	...	1,739	4,993		
...ford, Mass	79	400	...	...	1	4		
... Conn	40	190	...	...	15	50	55	319
, La	...	...	2	16	...	...	25	126
... ...l. Y	66,271	278,999	1,403	11,266	52,437	175,618	1,041	4,555
Portsmouth, Va	470	2,435	2,182	11,002	...	...	3,431	16,255
... N. Y	7,494	24,683	...	...	200	982		
, N. Y	211,785	956,033	...	...	219,781	749,873		
aquoddy, Me	472	2,700	...	...	363	1,550		
ola, Fla	...	...	...	...	...	...	159	596
Amboy, N. J	6,692	27,001	9,604	53,746	3,129	9,998	2,502	12,889
alphia, Pa	21,368	84,123	37,812	144,465	14,597	49,469	33,604	118,927
d and Falmouth, Me	4	26	...	...	17	78		
ence, R. I	50	275						
Sound, Wash	...	...	694	2,112				
nd, Va	...	...	837	6,696	...	...	2,173	17,994
ego, Cal	...	...	1	10				
ky, Ohio	...	...	7,275	21,901	...	...	1,982	5,948
ancisco, Cal	32	561	422	5,047	91	1,110	505	5,815
r, Mich	...	...	...	...	10	54	30	135
La	...	...	25	145				
nt, Vt	170	925	117	902	715	2,669		
Total	462,208	2,091,928	191,038	739,532	392,626	1,362,901	222,634	695,179

ve values and quantities of the exports from orts to the United States of anthracite and us coal are shown in Table LVI. In compar- se are given the exports and imports of s and manufactures of iron. In coal the total f exports is but little less than the value of im- rl in iron and iron ore the excess of imports s is very great. This table shows very plainly tion according to the various countries. The tes obtains its principal imports of coal from coal) and Nova Scotia, which supplies some Eastern points, while British Columbia ...ull ...ir coal to San Francisco and the ... ports. The statement of domestic exports, shown in Table LIV., exhibits the fact that the principal part of the coal exported from the United States goes to Canada through various ports.

TABLE LV.—*Value of Imports for Consumption in the United States.*

Coal, value.	Duties.	Per cent.	Iron, value.	Duties.	Per cent.
$2,078,954·78	$516,006·95	24·09	$32,991,038·45	$12,115,096·22	36·07

FIRE-CLAYS OF THE COAL-MEASURES.

Fire-clays may be looked upon as a special term for the gray clays of the coal-measures, interstratified with

TABLE LVI.—*Imports and Exports of Coal, Iron Ore, and Iron to and from the United States, 1820–1881.*

Imports to the United States for the year ending June 30, 1881 [from Gov. Reports].			Exports from the United States to June 30, 1881 [from Gov. Reports].			
Country.	Bituminous Coal.		Anthracite Coal.		Bituminous Coal.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
Argentine Republic	8	$33				
China and Hong-Kong	.....	.....	4,569	$20,147		
Belgium	50	154				
Central American States	.....	.....	83	581	52	$715
Brazil	109	411	1,654	7,609	250	1,694
Chili	.....	.....	2,127	10,991		
Denmark	30	124				
France	49	122	30	161	390	1,888
Dutch West Indies	.....	.....	.....	.....	500	1,925
French " "	30	91	1,404	5,577	625	2,400
Danish " "	.....	.....	3,847	15,649	5,397	20,036
French Possessions in Africa and adjacent islands	9	20				
Miquelon, Langley, St. Pierre Islands	.....	.....	198	940		
Germany	519	1,432	.....	.....	200	1,000
England	217,160	677,385	471	2,440	1,552	7,760
Scotland	30,092	84,416				
Ireland	50	128				
Russia on the Baltic and White Seas	.....	.....	.....	.....	110	660
Gibraltar	55	105				
New Foundland and Labrador	.....	.....	1,949	8,602		
Nova Scotia, New Brunswick, and Prince Edward Island	131,647	250,429	48,861	198,278	1,297	8,758
Quebec, Ontario, Manitoba, and the North-west Territory	983	5,249	362,477	1,670,847	108,057	387,262
British Columbia	207,432	735,873	17	323	55	675
Uruguay	.....	.....	531	2,218		
British West Indies	56	200	1,268	8,602	491	1,894
British Guiana and Honduras	2	4	320	1,723	2	12
British Possessions in Africa	293	634				
Tripoli, Tunis, Morocco, and Ascension						
British Possessions in Australasia	88,464	251,288				
Italy	50	112	130	500		
Japan	.....	.....	280	1,133		
Mexico	34	170	1,926	9,105	1,396	7,388
San Domingo	.....	.....	1,205	4,703		
Peru	20	82				
Hawaiian Islands	.....	.....	1,987	10,967	775	2,991
Azores, Madeira, Cape de Verd Islands, and Portugal	12	26	17	95		
Porto Rico	.....	.....	166	830		
Spain	60	200				
Cuba	19	59	24,853	105,021	63,948	267,541
Hayti	.....	.....	232	1,158		
Turkey in Africa	100	205				
Venezuela	.....	.....	606	2,729	586	2,373
United States of Colombia	4	10	961	4,338	6,125	23,560
Total	677,357	$2,008,962	462,169	$2,095,167	191,038	$739,389

Countries.	Imports for year ending June 30, 1880.		Exports for year ending June 30, 1881.	
	Cwt.	Value.	Cwts.	Value.
England	115	$1,183	720	$9,000
Quebec, Ontario, Manitoba, and North-west Territory	88,321	164,623	9,238	42,499
Total of Iron Ore	88,436	$165,806	9,958	$51,499
IMPORTS OF IRON FROM ALL COUNTRIES:	Pounds.	Value.	Pounds.	Value.
Pig iron	935,981,466	$8,766,461	8,303,441	$117,723
Railroad bars or rails of iron	273,979,293	3,824,720	2,164,648	48,946
" " " steel	403,159,482	6,507,048	146,168	6,076
Steel ingots, bars, sheets, and wire	.....	6,218,453	346,333	37,634
Old rails and scrap iron	535,000,000	6,381,608		
Castings, bar, boiler, band, hoop, & scroll iron. Sheet iron, anchors, cables, and chains	135,956,422	3,582,436	10,028,874	
Cutlery, saws, files, tools, and other manufactures of iron and steel	.....	11,119,021		13,968,571
Total	2,284,076,663	$46,399,747	20,989,464	$14,168,250

and generally in close proximity to, the seams of coal, in beds varying from a few inches to many feet in thickness. They are locally known as "clunches" and "under-clays," and are supposed to represent the soil that produced the vegetation from which the coal was formed. The association of coal with the fire-clays of the Carboniferous formation has localized the manufacture of fire-bricks, and by far the larger proportion are produced in the coal-measure districts. The fire-clays of the coal-measures vary as regards their refractory character, not only in the different coal-fields, but the individual strata in close alternation often present sudden variations, refractory beds being interstratified with useless strata largely charged with disseminated carbonate of iron. The gray color of the coal-measure clays is largely due to the presence of this mineral. The average contraction of the coal-measure fire-clay is a little over 2 per cent.

The importance of these clays in England may be realized from the fact that in 1880 they produced 3,062,544 tons, valued at £1,635,650. The product consists of fire-clays, potter's clay, china clay, and stone.

Prof. J. P. Lesley, State geologist of Pennsylvania, gives his theory of the formation of fire-clay as follows: "The thick and valuable deposit described and repeatedly alluded to in this report as underlying the Kittanning coal is but one of a number of such in other parts of the Appalachian coal-fields, equally stimulating to the curiosity of the geologist. Since Sir W. E. Logan first published the fact that every true coal-bed has its underclay, efforts have been made to explain its cause, but not with entire success. I make the following suggestion: A peat-bog, and still more truly a lake, invaded on all sides by sphagnous vegetation, must have a water-circulation set up by evaporation from the central surface and by percolation from the surrounding land. But this circulation must be feeble, capable of carrying only the finest mud. In the course of ages the amount of clay—all of it fine, and all of it of one kind—thus abstracted from the dry ground and transferred to the peat-filling hollows, must be very large. The dry grounds are chiefly a mixture of fine gravel, rounded grains of quartz, and rounded grains of feldspar. The pebbles and sand are not soluble; the feldspar is. The former remain behind; the latter follows the in-draft, and settles beneath the evaporating surface through and beneath the floating peat. If,

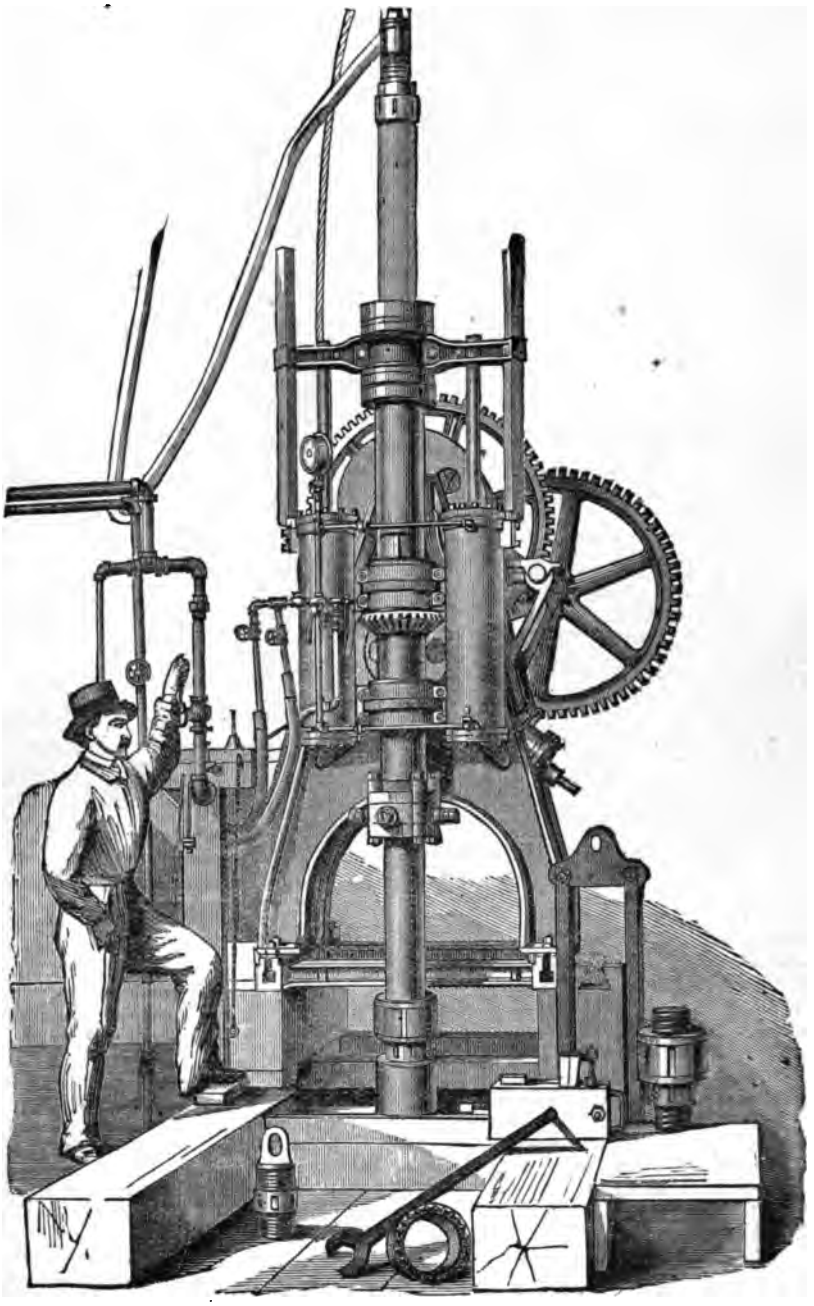


FIG. 37.—Diamond Drill.

however, the area of forming coal-bed be surrounded by clay land, instead of sandy or gravelly land, then the percolation is reduced to a minimum, and with it the solution of feldspar. The supply of water in the pool or marsh is kept up from the land-surface, and not from the underground; and under such conditions the incoming rain-water must be much less muddy and the deposit of under-clay is reduced to a minimum. We might look then for a law somewhat like this: Where a coal-bed has a heavy under-clay, the margins of its basin were probably sand- or gravel-banks. Where a coal-bed (of such a size as to argue for its great age) has a small under-clay, it grew within a circle of older light clay deposits. Where a limestone underlies a coal-bed, stretches of exposed older lime-deposits must have been within drainage-reach all around or on some principal side of it."

"The corollary is, that the thickest under-clays belong to beds next or near the great sand-rock members of the system; which is a fact: the most persistent fire-clay beds belong near the base of the Lower Productive coal-measures. Another consequence of such a law would be, that sand-rocks lying geologically below great under-clays should be more open and discreet, purer sands and gravels, than others that had not been robbed of so large a quantity of interstitial clay. I say *geologically* close below, for of course the coal-bed itself would protect from this operation a sand or gravel deposit lying actually or topically underneath it. When the surrounding land contained iron I would expect ball ore in the fire-clay. In fact, the ponds of New England receive such accumulations."

Mining Operations.

Deep Coal-Shafts.—The Pottsville shafts of the Philadelphia and Reading Coal and Iron Company near Pottsville, Pa., are nearly 1700 feet in depth—much the deepest coal-shafts in America—and were put down very quickly by means of the diamond drill. These shafts, two in number, as required by the Pennsylvania

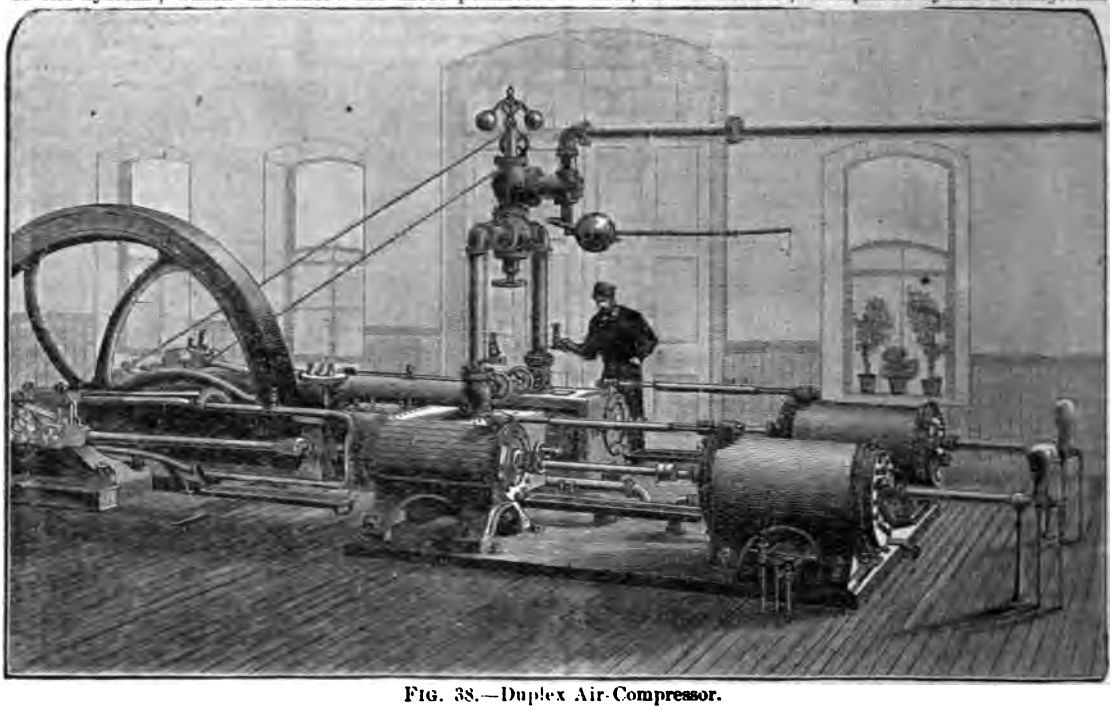


Fig. 38.—Duplex Air-Compressor.

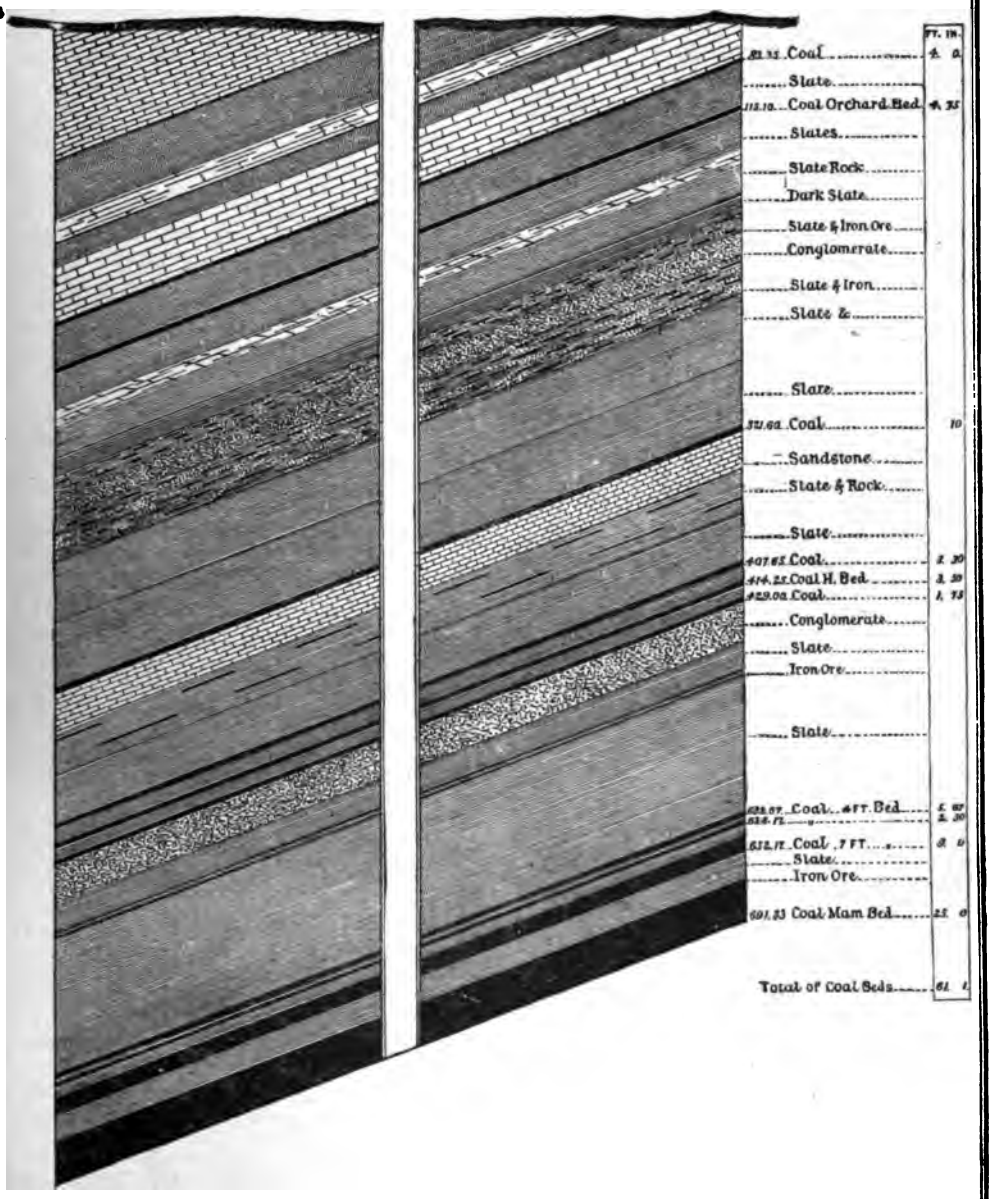
mining law, are situated 700 feet apart. They are known as the East and the West shafts. The former is intended solely for raising coal: it is 16 feet long and 13 feet 10 inches wide outside of the timbers, and is divided into two compartments. The West shaft is 25 feet 8 inches long outside of the timbers, and is divided into three compartments, two of which are used for hoisting coal, men, timber, rock, etc., and the other for an upcast for ventilation of the collieries. In sinking these shafts it was determined to dispense with the use of hand-labor in drilling the holes for blasting, and the diamond drill (see fig. 37) was chosen as the best instrument for the purpose, adopting a new plan; which was to sink the shaft down to solid rock in the usual way, and then by a number of diamond drills, each driven by its own steam-engine, to bore a series of holes about 300 feet deep, which should be so arranged as to dispense with further drilling for blasting until that depth had been reached. In the East shaft twenty-five holes were bored, and in the West shaft thirty-five. The bit adopted for the drill, which has since come into general use, differed from the ordinary diamond bit in use up to that time in being concave instead of convex. It has circular grooves and small cylindrical holes for the outlet and circulation of water, which is forced down through the centre of the boring-rods. The rods are made of gas-pipe 1¼ inches in diameter. The water takes up the fine sand or pulverized rock, carries it away from under the bit, and then rises on the outside of the rods or pipes to the surface.

When all the holes were bored to a depth of from 250 to 300 feet, the machines, pumps, etc., were taken to the other shaft to bore the holes in it. During the boring in one shaft the rock was blasted and removed in the other. The diameter of the holes was in all cases 1¼ inches. On the completion of the boring they were

CROSS SECTION OF WADESVILLE SHAFT NEAR POTTSVILLE, PA.

BY

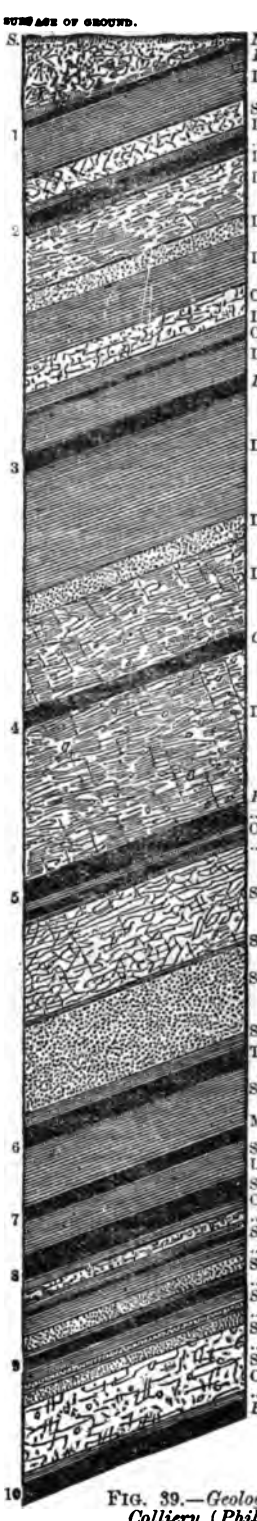
W. S. SHEAFER, M.E.



with sand, and the work of blasting
e rock was begun.
of blasting was conducted as follows:
ieans of a small pump, such as is used
ring-rods, removed the sand from nine
i of from 3 to 4 feet. Clay was then
iole, so as to make a plug from 6 inches
d on the top of this a cartridge of dua-
nd the holes were then tamped with
dges were connected together by wires
amic battery, and were all fired at once.
s produced by a cap filled with fulminate
e result of the simultaneous discharge
es was the formation of a large cavity in
shaft to the depth of the bottom of he
oosened rock was removed, and the re-
ere charged and fired in the same way
he shaft preserved their proper form,
ting was necessary for trimming them
the holes around the shaft had been
egan again with the nine central holes;
at on in this manner until the depth to
had been bored was reached; the ma-
set to work again and the holes bored
feet deeper. The shaft was timbered as
ed—yellow-pine timber 2 inches by 12
first skin to skin, and afterwards 2 feet
below the iron girders. The guides were
w pine, and were put in as required.
run day and night continuously, and the
d at an average rate of 34 feet per day
ours, including all delays, except those
ng to blast away the rock. The East
May 5, 1871, and finished Aug. 14,
ft was begun Sept. 1, 1871, and fin-
ro. (See Plates XII., XIII., XIV.)
shaft (Plate XV.) is located about one-
of the Pottsville shafts, and cuts 661 feet
ta cut by them. The Mammoth coal-
ked by this shaft for some fifteen years,
e amount of coal. This shaft was lo-
the Messrs. Sheafer, mining engineers,
moth bed at 619 feet from the surface.
the mine inspectors of Great Britain

ift at the Ashton Moss colliery, Ash-
ntained on the 5th of March, 1881, a
ds, to the floor of the Great Mine bed
arently the deepest vertical mine in
l it is still being sunk deeper, with the
a lower seam in conjunction with the
ie temperature of the strata, so far as
ars to be lower than the average. At
ated as being, in rock, 78° Fahr., and
oal, 86°. From information supplied
rs and the sinkers, it appears that
ards in depth, the shaft being 18 feet
for 16 feet when walled, a system of

A circle of eight converging
e deep, 2 inches in diameter, equally
d a circle 2 to 14 feet in diameter,
ut 2½ pounds of dynamite, or 20 pounds
as first fired, and after firing, the stuff,
illed out. A circle of twelve straight-
o to 6½ feet deep, and equidistantly
l the cir ference of the shaft, and
D each, or 24 pounds between
which generally gave about 40 to
bottom and sides were squared



	Thickness of Strata.	Total distance.
N.....Waste	5 00	5 00
Little Tracy Vein.....	4 06	9 06
Dark-gray slate.....	35 00	44 06
Siliceous rock.....	20 00	64 06
Dark gray slate.....	3 10	68 04
.....*Tracy Vein*...	7 02	75 06
Dark-gray slate.....	5 00	80 06
Dark-gray slate, with iron-ore balls.....	41 03	121 09
Light sandstone.....	15 03	137 00
Dark-gray slate.....	32 00	169 00
Conglom. rock.....	21 00	190 00
Dark-gray slate.....	11 00	200 00
Coal.....	3 00	204 00
Dark-gray slate.....	25 00	229 00
Diamond Vein.....	11 06	240 06
Dark-gray slate.....	83 02	323 08
Dark sandstone.....	17 00	340 08
Dark-gray slate, with iron-ore balls.....	61 00	401 08
Orchard Vein.....	8 10	410 06
Dark-gray slate, with iron-ore balls.....	106 06	517 00
Primrose Vein.....	13 09	530 09
..... Slate...	6 06	537 03
Coal.....	4 06	541 09
.....Slate...	2 00	543 09
Siliceous rock.....	66 06	610 02
Slate	... 04	610 00
Sandstone.....	60 00	670 06
Slate	10 00	680 06
Top meta.....	13 00	690 06
Slate.....	41 06	735 00
Mid. mem.....	8 06	743 06
Slate.....	24 00	767 06
Low. mem.....	16 00	783 06
Mammoth Vein.		
Slate.....	6 09	790 03
Conglom. rock.....	8 06	798 09
.....Slate...	6 09	805 06
Skidmore Vein.....	4 00	809 06
..... Slate...	11 00	820 06
Sandstone.....	11 09	832 03
.....Slate...	3 03	835 06
Seven-foot Vein.....	7 00	842 06
..... Slate...	9 06	852 00
Sandstone.....	4 00	856 00
.....Slate...	... 09	856 09
Sandstone.....	9 06	866 03
Conglom. rock.....	45 06	911 09
..... Slate...	6 09	918 06
Buck Mountain Vein....	13 00	931 06

FIG. 39.—*Geological Section near Ellangowan Colliery (Philada. and Read. C. and I. Co.), Shenandoah, Schuylkill co., Pa.*

off with small holes, in which powder was used. The dynamite was put into the holes in 2-ounce cartridges, and the stemming was either water or sand. The firing was by electricity, the batteries being placed in a mouthing about 450 yards from the surface. Partly owing to the steepness of the dip of the strata, and partly to the vibration caused in the neighborhood, this system was given up. During fifteen days over which it extended 11 yards were sunk and 7 yards walled, as compared with 15 yards sunk and walled by the ordinary way with powder and tonite. To be successful it appears there should be two shafts sinking, and the work so arranged that the men could go from one pit to the other, one set of men being set to drilling and preparing shot-holes, whilst the other set are filling out the stuff from the firing." These are representative shafts in their respective countries.

The first shaft in the Southern coal-field of Pennsylvania was commenced by Alfred Lawton in 1845, on the west side of Mill Creek, not far south of Mine Hill, in the town of St. Clair. This shaft was sunk 72 feet, then a boring penetrated to a depth of 122 feet to the Primrose bed, when it was abandoned. In 1851, E. W. McGinnis continued the shaft down to the Primrose, and then bored to the Mammoth. He met with decided success, and immediately determined to sink the shaft (10½′×18′) to the Mammoth bed. The following table shows the strata cut and the distances of some of the layers from the surface:

	Thickness.	Depth from surface.
Rock and slate.....	119 feet.	
Primrose coal..	3 "	122 feet.
Rock and slate...	68 "	
Holmes coal.	4 " 6 inches.	194 " 6 inches.
Rock 64 feet, slate 10 ft.	74 "	
Coal.....	1 "	296 " 6 "
Slate.....	51 "	
Coal.....	1 " 8 inches.	322 " 2 "
Rock 54 feet, slate 18 in.	72 "	
Coal, Seven-foot vein...	8 " 6 "	402 " 8 "
Slate	14 "	
Mammoth White-ash..	22 "	438 " 8 "

Before continuing the enterprise of Mr. Lawton, however, Mr. McGinnis had prosecuted an extensive boring operation on East Norwegian Creek, on the lands of the Delaware Coal Company. This was begun in 1850 by a shaft sunk 170 feet deep, then by a boring to a depth of 656 feet. The following was the result:

	Thickness.	Depth from surface.
Slate and sandstone...	42 feet.	
Coal and black dirt. .	18 "	
Rock and slate, with iron ore.	. 431 " 8½ inches.	491 feet 8½ inches.
Black dirt.....	6 " 6 "	498 " 2½ "
Slate 4 feet 6, and rock 4 feet 6	.. 25 "	523 " 2½ "
Coal.....	5 "	528 " 2½ "
Rock and slate.	127 " 9 "	656 "

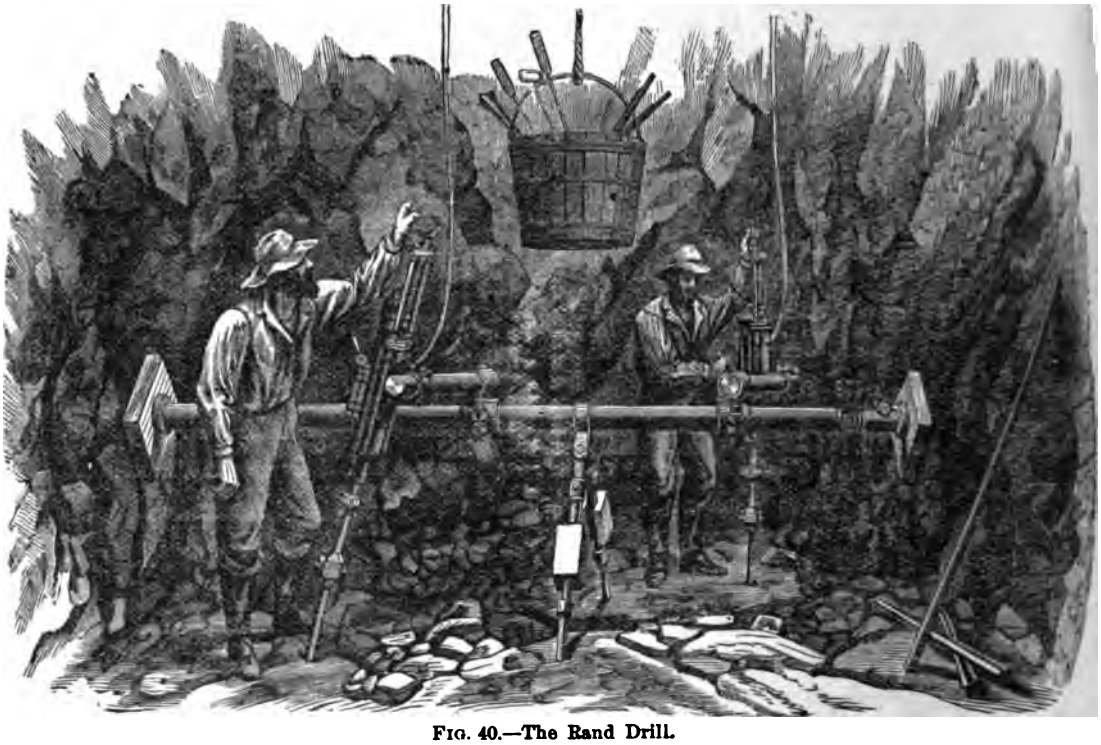
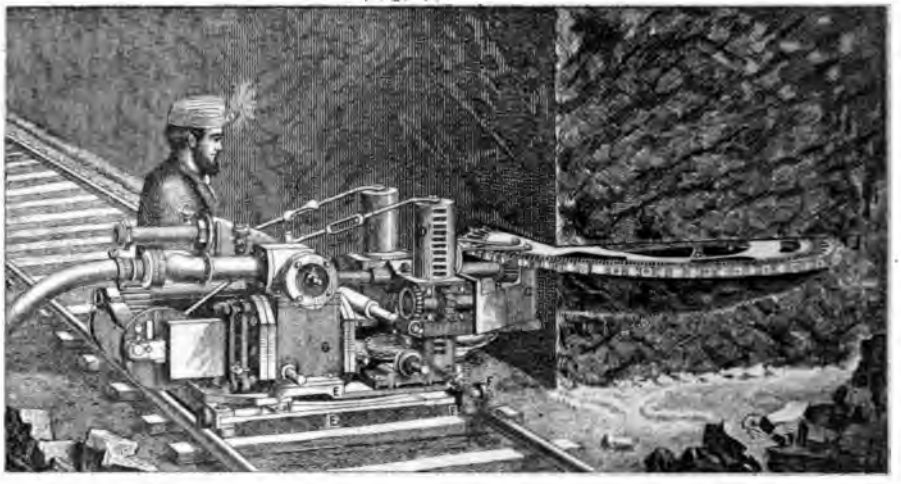


FIG. 40.—The Rand Drill.

This boring terminated in slate. Being located farther south from the outcrop of the Mammoth bed than the Mill Creek shaft, it was necessary to penetrate deeper in order to reach that coal.

The third deep boring was undertaken by the North American Coal Company, who employed the writer to direct the operation. After careful exploration of the surface he located upon the company's land in Crow Hollow Valley. The boring was begun in 1852, and finished in 1853. The following shows the strata cut:

FIG. 1.



MONITOR COAL CUTTER.

Weight	3,400 lbs.
Cylinders	9in diam 8in stroke.
Extreme Depth of Cut	56in.
Height from rail to top of rocker valve chest	23in.
Air Pressure Required	20 lbs.

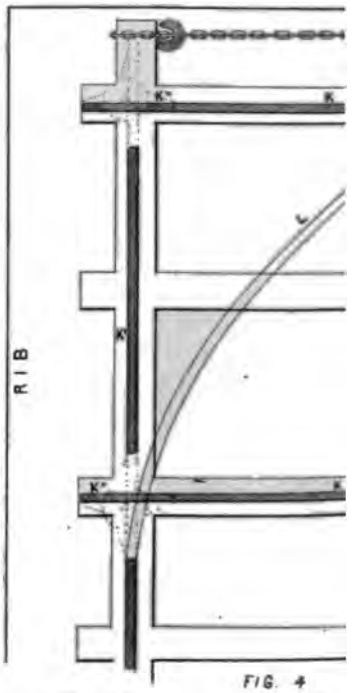


FIG. 4

PLATE XVI.

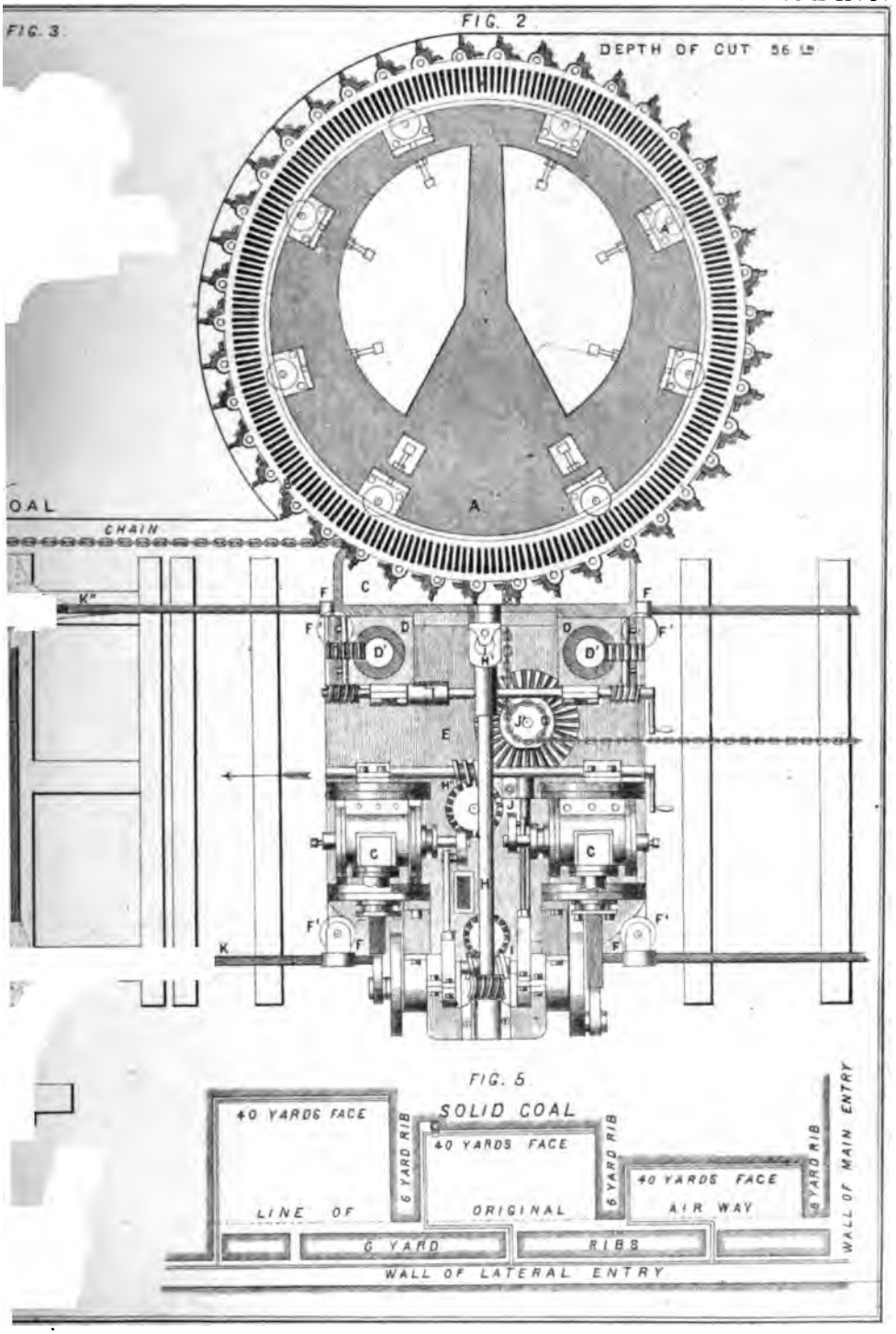


FIG. 3.
FIG. 2
DEPTH OF CUT 36 In
A
CHAIN
C
F
F'
D
D'
H
E
J
K
K"
FIG. 5
SOLID COAL
40 YARDS FACE
6 YARD RIB
40 YARDS FACE
6 YARD RIB
40 YARDS FACE
6 YARD RIB
LINE OF
ORIGINAL
AIR WAY
WALL OF MAIN ENTRY
6 YARD
RIBS
WALL OF LATERAL ENTRY

	Thickness.	Depth from surface.
Sandstone, slate, and rock	88 feet 1 inch.	
Holmes coal	4 " 2 "	92 feet 3 inches.
Sandstone and slate	57 " 5½ "	149 " 8½ "
Dark-brown slate, with iron ore and of coal.	35 "	184 " 8½ "
with header of coal.	10 " 2 "	194 " 10½ "
ck and slate	189 " 1½ "	384 "
te	21 "	405 ft. to Mam. bed.

These were but the beginning of a series of enterprises for the development of the Lower large coal-seams, which must undoubtedly form the chief sources of supply for future demands. Among others were—

Brown's shaft to the Primrose, at Mount Laffee, on West Norwegian Creek.

Miller's shaft, 85 yards deep, to the Lewis coal-bed; thence a slope, 100 yards, on the dip of the coal. Also, on West Norwegian Creek, near Pottsville.

The *Eagle Hill* shaft, east of St. Clair, sunk in 1846; now working.

The *Snyder* shaft, at Pine Forest, 300 feet deep, to the Mammoth coal-bed, in Crow Hollow, near St. Clair; sunk in 1866.

The *Donaldson* (Sharp Mountain) shaft, near Tamaqua, 364 feet deep; sunk in 1862.

The *Kaska William* shaft of the Alliance Coal Company, in the Upper Schuylkill Valley, now sinking; recently cut 13 feet of coal.

The *Silver Brook* shaft, on lands of the Catawissa Railroad Co., sunk in 1861 to a depth of 140 feet, to the Mammoth coal-bed.

The *William Penn Colliery* shaft, 250 feet deep, west of Shenandoah; sunk in 1864.

The *Kohinoor* shaft, in West Shenandoah, sunk in 1870; 403 feet, to the bottom of the Mammoth bed.

Plank Ridge shaft, sunk in 1870; 257 feet to the Seven-foot bed, here 14 feet thick; thence to the Mammoth, 33 feet thick.

Other shafts in Schuylkill county are—*Thomaston*, north of Mine Hill; *Ellangowan*, east of Shenandoah (see fig. 39); *Bear Valley* shaft, at Shamokin; and others.

The *Wyoming* coal-region in 1871 had the following number of coal-shafts:

Delaware and Hudson Company	7
Delaware, Lackawanna, and Western Railroad Co.	15
Pennsylvania Coal Company	12
Wilkesbarre Coal and Iron Co	5
Other companies and individuals	14
Total	53

Explosives form a very important branch of study in mining operations. In few mines, and those not the valuable, is the coal so soft that it can be profitdug with pick and shovel. Sometimes, especially beds, "holing" is resorted to, the miner lying e and laboriously cutting away the under side of the coal, so that the mass will fall of its own weight; but this is both difficult and dangerous, since, should he miscalculate and cut a little too far, the mass falls on, and crushes, him.

Gunpowder, dynamite, nitro-glycerine, and all other known explosives have been freely used in the work of mining coal, but there are objections to all of them, the most serious being that they vitiate the air and are apt to fire explosive gases, thus often causing terrible disasters. Efforts are still being made to discover more powerful and less dangerous explosives, but success thus far has only moderate. The following is a list of new compounds lately tried in the Polnick-Astrau colliery, Austria, all of which are superior to gunpowder or dynamite:

1. *Peralite* is a coarse-grained powder, containing 63 per cent. of nitrate of potassium, 30 per cent. of coal, and 6 per cent. of sulphate of antimony.

2. *Ialine*, which contains from 65 to 75 per cent. of nitrate of potassium, 10 per cent. of sulphur, 10 to 20 per cent. of lignite, 3 to 8 per cent. of picrate of soda, and 2 per cent. of potassium, is less inflammable and less violent in its action than peralite, but brings away larger quantities of coal and in larger pieces.

3. *Carbazotine*, which contains about 610 parts per 1000 of nitrate of potassium, 8 of sulphate of iron, 247 of soot or lampblack, and 135 of sulphur, has only half the weight of gunpowder, and is very hygrometric, but may readily be dried by the heat of a stove. Its action is slow, and it ignites with difficulty, so that it is perfectly safe, and may be recommended when great precaution is needed.

4. *Coal Dynamite No. 3* is similar to Nobel's cheap dynamites, and consists of a mixture of nitro-glycerine and gunpowder of inferior quality, which in this case takes the place of porous silica.

The proportion of large, medium, and small coal produced by the different substances is as follows:

	Large, per cent.	Medium, per cent.	Small, per cent.
Coal dynamite	21·4	35·6	43·0
Carbazotine	26·3	37·7	36·0
Peralite	19·9	37·7	44·4
Ialine	22·9	38·5	38·6

As the use of nitro-glycerine compounds by persons who are unacquainted with their special properties is a frequent cause of accident, the following suggestions for the guidance of those who employ these compounds in mining pursuits are published by the British mine inspectors:

"1. In mines these explosives should be kept in a metal box with a hinged cover.

"2. Frozen cartridges should be thawed in a double metal box, the outer compartment being filled with warm water.

"3. Frozen cartridges should not be placed on any metal, stone, or brick work directly heated by fire.

"4. Frozen cartridges should not be placed in bore-holes, as they are not exploded by ordinary detonators.

"5. Packages containing cartridges must be kept dry.

"6. Packages showing any exterior water-damage should be carefully examined, to see if any nitro-glycerine has exuded from the cartridges.

"7. Damaged packages must not be struck with any metal or hard substance, or roughly handled.

"8. Any nitro-glycerine which has exuded from the cartridges should be absorbed by some soft, dry substance, such as infusorial earth, sawdust, or blotting-paper.

"9. Waste material containing nitro-glycerine and fragments of cartridges must not be thrown into water; they should be destroyed by firing with a detonator, or by mixing them with an excess of sulphate of iron (copperas), or by burning small quantities at a time in an open fire.

"10. In burning the waste, care should be taken not to inhale the fumes, as they are more poisonous than the substance itself.

"11. Bore-holes in wet ground should not be bored upward.

"12. In wet ground a hole must not be put in below a missed shot.

"13. Missed shots must not be bored out.

"14. Charges in wet ground should be fired directly after charging.

"15. Powder must not be charged on top of dynamite or lithofracteur.

"16. Charges should always be fired by a detonator.

"17. The primer, with a cap affixed, must never be rammed.

"18. The cartridge should pass easily to the bottom of the bore-hole. Cartridges that fit the hole tightly must not be forced down by ramming."

Experiments have been made in a number of English collieries with the Reuss system of bringing down coal by means of cartridges exploded by compressed air. From a report made on the subject to the North Staffordshire Institute of Mining and Mechanical Engineers, by Mr. Ernest Craig, we take the following data: The cartridge is simply a hollow cast-iron cylinder, varying in strength to suit the class of coal. It is estimated that to burst a cartridge half an inch in thickness a pressure of 6700 pounds per square inch is necessary, and for every additional $\frac{1}{16}$th of an inch in thickness an increase of 1000 to 1500 pounds per square inch is required. The air-compressor pumps the air into the cartridge, the machine being worked by two men. It is made to run on rails, and stands about 3 feet 6 inches in height. The connection between the machine and the cartridge is made by means of hydraulic tubing which has an internal diameter of $\frac{1}{2\frac{1}{3}}$d part of an inch, the whole machine and construction being made capable of standing a pressure of 20,000 pounds per square inch. With the air, a small quantity of water is also pumped into the cartridge, to act as a slight check upon the violence of the expansion at the bursting of the cartridge. When the pressure reaches about 6700 pounds the cartridge explodes and the coal is brought down. The explosion is not accompanied by any great noise, and pieces of coal are not thrown any distance.

A new method of mining coal by means of lime cartridges is described by Paget Mosley. The method has three objects: First, to take the place of blasting-powder, dynamite, or other explosives, thereby giving absolute immunity from all accidents arising from the use of these agents; secondly, to enable the colliery-owner to secure a greater amount of large coal from a given area, at less cost; thirdly, to lessen the labor of the miner.

The mode of operating is to employ lime in a specially caustic state, made from mountain-limestone. This is ground to a fine powder, and consolidated by a pressure of about 40 tons into the form of cartridges $2\frac{1}{2}$ inches in diameter, having a groove along the side. These are then packed into air-tight boxes to protect them from damp, and are ready to be conveyed to the mine for use.

The shot-holes are first drilled by means of a light boring-machine, and an iron tube about half an inch in diameter, having a small external groove on the upper side, and provided also with perforations, is then inserted along the whole length of the bore-hole. This tube is enclosed in a bag of calico, covering the perforations and one end, and has a tap fitted on the other end.

The cartridge having been inserted, a small force-pump is connected with the tap by a short flexible pipe, and a quantity of water, equal in bulk to the quantity of lime used, is forced in. The water, having reached the end of the hole, escapes along the groove and through the perforations in the tube, flowing into the lime and driving out the air. The tap is then closed, so as to prevent the escape of the steam generated by the action of the water on the lime, and the flexible pipe is removed.

The action of the steam first takes place, cracking the coal away from the roof, followed by the expansive force of the lime. There is always some little time before the steam attains a high pressure, so that all danger can be avoided. The whole time occupied in drilling a hole 3 feet deep and $2\frac{1}{2}$ inches in diameter, setting up the drill, charging the hole, and pumping in the water, is seventeen minutes. The principal advantages of this method are—(1) Absolute freedom from explosions of gas, there being no fire, no smoke, or smell of any kind. (2) The roof is not shaken, and the coal produces less dust; skilled labor is unnecessary. (3) The apparatus is simple and inexpensive, easily carried about, kept in order, and can be used in thin seams. (4) Any number of holes can be charged, and by applying the water in quick succession a continuous pressure is brought to bear along the face, which causes the coal to fall in large masses.

The following tables show interesting comparisons of the accidents in mining in the United States and Great Britain. It should be understood that the statistics for the United States refer only to anthracite mines:

TABLE LVII.—*Accidents in Anthracite Coal-mines, by H. M. Chance.* (ART. "Inst. Mining Engineers.")

Years.	Roof falling.		Explosions		Miscellaneous.		Totals.	
	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.
1871.....	69	144	26	149	115	239	210	532
1872.....	100	111	28	53	95	182	223	346
1873.....	116	200	33	112	115	373	264	685
1874.....	94	173	27	107	110	259	231	539
1875.....	97	209	18	82	133	298	248	589
1876.....	89	144	29	116	100	196	218	456
1877.....	115	197	12	119	61	252	188	468
1878.....	79	199	23	34	85	270	187	503
1879.....	131	243	29	130	102	418	262	791
Totals.....	890	1620	225	902	916	2487	2031	5009
Grand total ...	...	2510	...	1127	...	3403	...	7040

TABLE LVIII.—*Fatal Accidents in Mines of Great Britain [from Mine Inspectors' Report 1880].*

Year.	Tons Mined.	Fire-damp Explosion.	Roof and side falling.	Shaft.	Miscel. Underground.	Miscel. Surface.	Total.
1871	...	52	426	118	161	69	826
1872	...	62	445	131	179	77	894
1873	128,680,131	44	474	158	211	86	973
1874	126,590,108	44	403	145	200	103	895
1875	133,306,485	41	440	153	196	97	927
1876	134,125,166	42	430	120	146	101	839
1877	134,179,968	45	432	117	172	98	864
1878	132,612,063	31	456	94	146	84	811
1879	133,720,393	35	416	95	167	69	782
1880	146,969,409	28	445	77	177	88	815
Total.....		424	4367	1208	1755	872	8626
Average.....		42·4	436·7	120·8	175·5	87·2	862·6

COAL-CUTTING MACHINES.—The accompanying diagram (Plate XVI.) shows a coal-cutting machine described at a meeting of the American Institute of Mining Engineers in 1875, as used at the Coal Brook mines. The lateral entry is driven as a base, and, separated by a 6-yard rib or pillar, an air-way is carried parallel to it the same distance. Leaving a 6-yard rib to support the main entry, the wall of the air-way is divided by 6-yard ribs into three 40-yard faces. The machine cuts the most distant face, and is then removed to the second, and repeats the operation while the coal in the first face is taken down. By having a third face always

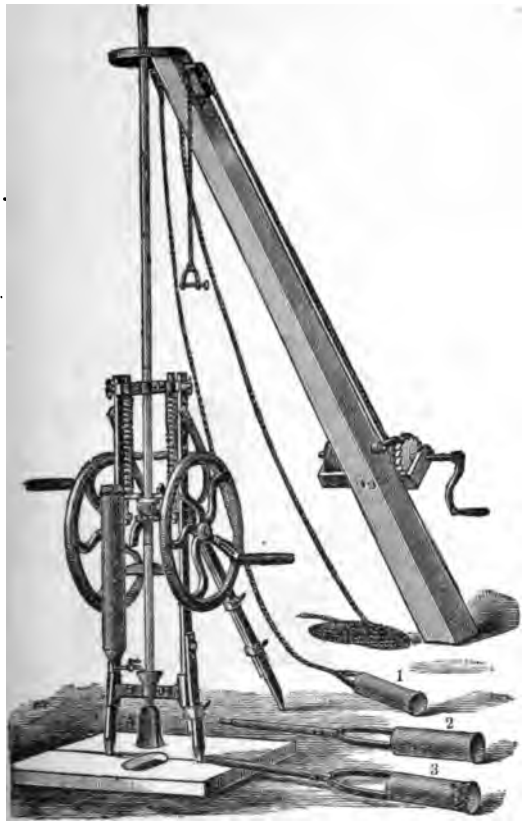


FIG. 41.—Victor Rock Drill.

in reserve the machine need not be delayed in case of a failure on the part of the takers-down to have the coal cleared from the first face cut. In the long rib, openings are made at intervals, through which the loaded cars can be pushed to the entry. Doors being provided for closing these openings when not in use, the air-current to the limit of the workings is not interfered with. When the faces are worked back 30 yards, the ribs are drawn and operations transferred to another place. In a 4-foot seam the capacity of one machine, the mine being opened in this manner, would be 50 tons for each shift of 10 hours, or by running night and day the output would reach 100 tons in twenty-four hours. The production of the same quantity by manual labor alone would require the enlargement of the working area so as to accommodate thirty to forty men, together with an accompanying increase of mine-equipment. Machine-cut coal comes out so free from slack that high buildings for dumping and screening are unnecessary, and at drift mines an engine might be entirely dispensed with.

Another very important feature recommending machinery is that, operations being more concentrated, less territory is required to be opened, and the coal is so rapidly removed from the part of the mine worked that much of the annoyance and danger from disintegrated roofing and pillars is escaped. It should also be noticed that the machine above described can be used successfully in driving entries and in turning [illegible] entry-work the machine is advanced to the the heading, and, moving forward upon a straight track laid along the entry, channels its way in after the manner already described; and when the limit is reached it is swung to the right and to the left, undercutting to the width of 14 feet if desired.

COAL-WASHING.—Mechanical processes have been introduced to clean the coal and increase production. Coal-washing has been adopted in places in order to secure these results. The apparatus illustrated (Plate XVII.) first crushes the coal, then separates slate and impurities by reason of their different specific gravities.

COAL-BREAKERS.—The large and hard masses in which anthracite coal comes out of the mine, and the popular demand for its reduction to certain specified sizes, mainly for domestic uses, have given rise to the mammoth wooden structures seen all over the anthracite region of Pennsylvania, known as coal-breakers. The following account of these peculiar buildings is from a paper by R. A. Wilder, C. E., of Cressona, Pa.:

"The separation of anthracite into lumps of regular size was first done by breaking the coal with hammers on plates of iron having openings a little larger than the size of coal to be made, so that it would readily pass through and preserve something like uniformity of size; the broken coal was shovelled into screens turned by hand or set at an inclination, and the coal thrown against them, so that the waste and small pieces would pass through the meshes and fall behind, and the merchantable sizes roll down the front to the platform, from which it was loaded into wagons for transportation. This preparation increased the sales to such an extent that it was found difficult to meet the demand by the method used, and those interested in the business began to study plans for preparing coal by machinery. The waste and danger of breaking coal by hammers was too great to pass unheeded, and in 1842 crude machinery, driven by steam-power, was tried as an experiment, and failed. Two years later Joseph Batten of Philadelphia patented a machine for breaking coal, consisting of a pair of toothed rollers geared closely together and driven towards each other, through which the coal, not selected for special use as it came from the mines, was passed and broken into irregular sizes. One or two cylindrical screens made of light castings or large wire were placed just below the rollers, and the coal fell from them into the upper end. The screens were inclined at such an angle that the coal would move forward with each revolution. The smallest meshes or openings were in the first section, and they increased in size toward the lower end of the screen. The rotation was graduated to the required movement of coal, so that each particular kind would have time to be separated from the next size. The technical names given to the sizes were 'pea,' 'nut,' 'stove,' 'egg,' and 'broken;' 'steamboat' and 'lump' were taken out before going to the breaker. The sections of the screen were about 5 feet in length, and at the lower end of each a division was made in the trough below it, which took the coal to the main storage-chute, from which it was loaded into the cars; and this is the system in use now.

"The loading is effected by running the railway-cars under the chute and hoisting a small gate by means of a lever connected with it by a chain. There is a gate at each chute, and it is raised just high enough to permit the coal to run out slowly into the cars, so that the dirt which adhered to it in passing the main screen can be separated by means of a small rotary-screen or stationary bars at the end of the loading-chute.

"The toothed rollers, screens, and other appliances

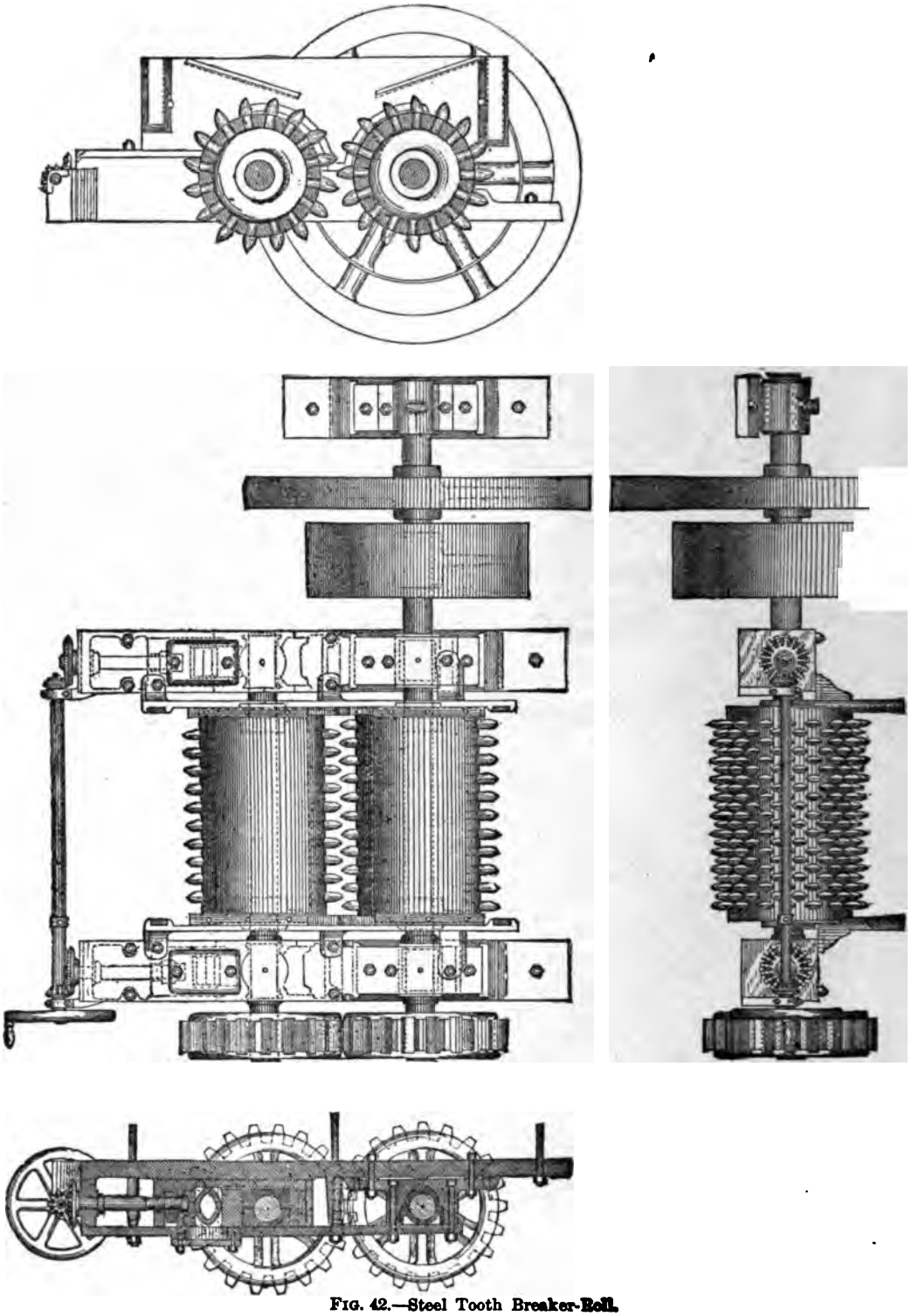
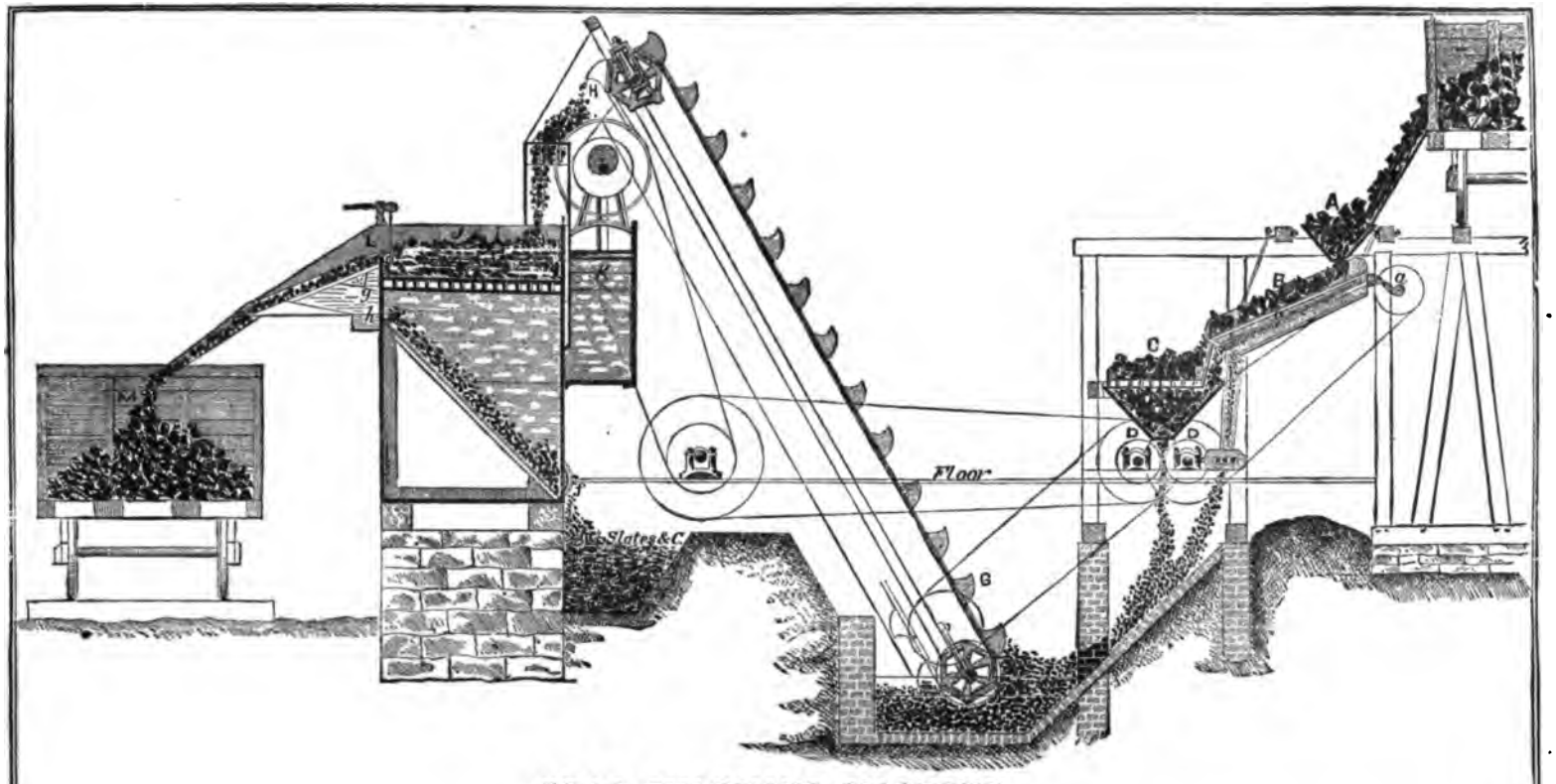


FIG. 42.—Steel Tooth Breaker-Roll.



COAL WASHING MACHINE,

By John. Fulton, M.E.

The method now in use at the furnaces of the Kemble Coal and Iron Company in the Broad Top Coal and Iron Region, for removing, by crushing and washing, slate and other impurities from coal, designed, when coked, for furnace use.

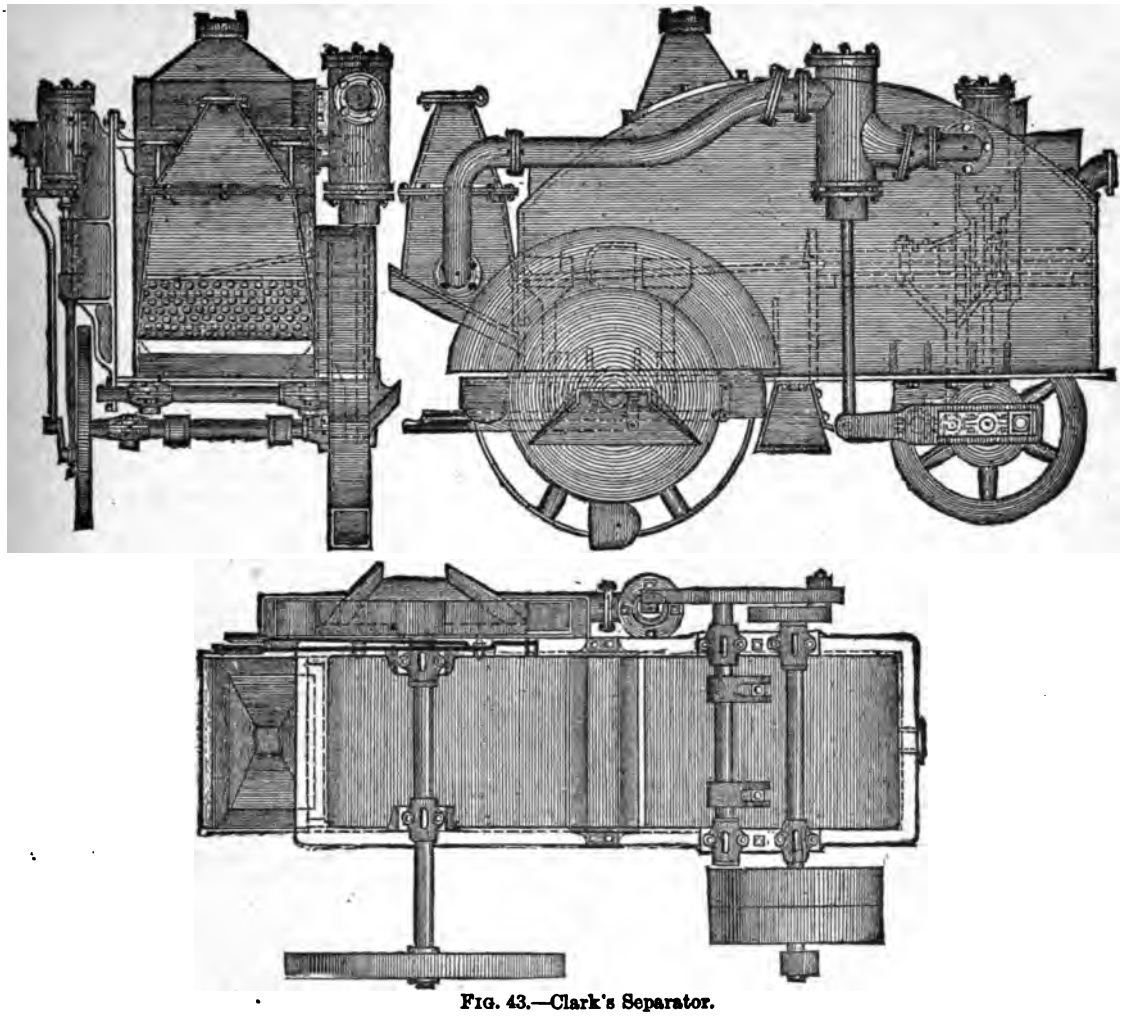


FIG. 43.—Clark's Separator.

used in the preparation of coal have not been improved upon to any great extent since they were first introduced. The plants have been enlarged in various ways, but the principle is much the same in all their parts. The buildings are frequently 100 feet in height, to allow the coal to pass from one set of toothed rolls to another, which it does through inclined passages lined with sheet iron to permit the coal to slide instead of rolling, which increases the waste. A first-class 'breaker' has a double set of large and secondary rolls, double screens for each set, and storage capacity for 800 tons of prepared coal. The cost of such works is about $50,000, and their duration is about twelve years, though the machinery is liable to be broken by various causes, and parts are frequently renewed.

"The slate and other larger impurities which are carried through the rolls and screens are generally picked out by boys called 'slate-pickers,' who are seated beside the troughs leading the coal from the screens to the chutes, and check its flow while they gather the impurities and throw them into other troughs, which carry them to the dirt- and slate-chutes, whence they are loaded into small dumping-wagons and hauled out and dumped upon the culm-banks at some distance from the breaker."

Among the few improvements made in breaker-machinery is a machine for picking slate, called a "jigger." This machine moves up and down in a tank of water: it is virtually an iron basket with a grated bottom, into which coal and impurities intermixed are dumped, and is worked by means of a crank or eccentric motion. The resistance of the water acts upon the coal and slate in this rising and falling movement by their different specific gravities; the former, being lighter, is carried over the edge into one compartment of the tank, and the latter, being heavier and thin in shape, falls and works through the grate into the other compartment; each is then raised by a small elevator and carried to its place of deposit. The operation of this machine washes the coal, and is more economical than picking by hand, but is less effective in separating all impurities, as the difference in specific gravity is not sufficient to make the separation perfect.

The accompanying description and illustration (Plate XVIII.) of an anthracite colliery-breaker are republished, by permission, from the report of Heber S.

Thompson, E. M., to the Girard Estate Trust of Philadelphia in 1879. The drawings of the Hammond colliery-breaker exhibit a ground plan and a front and side elevation, and show the arrangement of the machinery and method of cleaning, assorting, and breaking the coal.

Coal as it comes from the mines is of all sizes mixed together, from lumps of one ton in weight down to fine powder, and carries with it harder impurities, such as slate and rock, which generally occur in seams of coal and cannot be retained conveniently in the mine, also varying in size from minute particles to slabs weighing nearly a ton.

Coal so finely broken as to pass through a screen mesh three-eighths of an inch square is usually called "dirt," and is at present largely a waste product. It occurs quite often in the seam as *dirt*, but is more largely produced by the crushing of the coal during the processes of mining, handling, and transporting.

The purposes for which a breaker is required, are—First, to separate the dirt, slate, "bone," and rock from the coal; second, to separate small coals of different sizes from each other; third, to break down such pieces as are too large into suitable sizes. And it is desirable that these requirements should be be fulfilled with as little cost of handling and waste of coal as possible.

At the Hammond colliery the product of the mine is raised through the slope in small cars, called wagons, which run by gravity from the head of the slope to the breaker-tips or dumps, two in number, A, A, where they are dumped and emptied in the manner shown. The empty wagons are pushed back by hand to the foot of the automatic plane B, by which they are raised to a height sufficient to allow them to return by gravity to the head of the slope. The mixed coal, slate, and dirt taken from the mine enters the "dump-shute" C, C, and reaches first the "main dump-shute bars" C^1, which are narrow cast-iron bars so set as to allow a space of 2½ inches between each two of them. Most of the material small enough to do so passes through these bars to the dump-shute "hopper" D, from which it is fed into the counter-screens E, E, one on each side, with their supplementary screens E^1, E^1, and E^2, E^2. All breaker-screens are circular, revolving, and slightly inclined away from the end at which the material to be screened is allowed to enter, so that whatever will not pass through the meshes descends gradually as the screen revolves to the other extremity, and drops out. They are divided into as many compartments, called "segments," as required, and covered with wire meshes of different-sized openings. The smaller mesh, being placed next to the end at which material is fed into the screen, extracts the dirt, and allows all large sizes to pass to the next segment, which extracts the next size, and so on.

In the counter-screens E, E, the first segments extract the chestnut coal and all smaller sizes. The pea coal and chestnut coal are separated from the dirt in the supplementary screens E^1, E^1. The other segments separate the large and small stove from the egg coal and larger pieces, which pass out at the ends of the screens, while the stove coals are again cleaned of smaller particles and flat slates in the supplementary screens E^2, E^2.

The dirt from all these screens passes down the counter dirt-shute D^5, and is hauled away on the tramway Z, across the trestling Y, Y, to the dirt-bank in small cars called "dumpers," which may be tipped on either side. The slate and bone separated from this coal, in part by the so-called slate-picker screens, and in part by hand-picking, containing a considerable quantity of good coal mixed with or adhering to it, is collected in the slate-picker hopper D, from which it is taken along the tramway Z^1 to the boiler fires, and used as fuel.

When it leaves the counter-screens the coal descends by its own weight along the narrow troughs F, F, called "telegraphs," the hand-picking being done by men and boys at convenient places along them, and is distributed thus: the pea and chestnut to the main pea and chestnut coal screens L^1, L^1, L^1; the large and small stove to the main screens L, L; and the egg and broken to the prepared-coal rollers K^1.

As the counter-screen material is usually wet, and the dirt adheres to it, this second screening is necessary in order to clean it properly. This completes the distribution of that portion of the wagon's contents which passes through the 2½-inch openings between the bars C^1 C^1 which is only the smaller sizes from egg down, with such of the larger thin slabs of coal as may turn edgewise and pass through the bars.

That portion of the wagon contents which passes over the bars C^1, C^1, goes to the steamboat bars C^3 on its way down to the dump-shutes, which are set 4½ inches apart. All that passes through the bars C^3 goes to the bars C^2, set 2½ inches apart, through which all below (and including) the egg coal passes to the dirt-screen E^2, where the dirt is separated from it, the coal going to the prepared-coal roller K^1 and main screens L, L, while the dirt goes into the hopper D^4, and thence to D^5.

In this process coal that should have passed through the bars C^1, but has been crowded over them, is separated in the dump-shute C, C, by bars C^2, and is removed and distributed as described. That portion which passes over the bars C^2 goes to the principal steamboat bars C^4, where it joins the coal from the steamboat roller K. The remainder of the wagon's contents goes down the dump-shute to the platform bars C^5, and contains nothing smaller than lump coal. The platform bars are set 9 inches apart, and that portion which passes over them goes to the first platform H, where such of the lumps as are suitable are pushed into the lump-coal shute I, and the slate and rock into the rock-shutes I^1, I^1, on either side. Here also such of the lumps as have streaks of slate or bone through them are broken by hand and the impurities removed.

All that is not suitable for lump coal is thrown down a hole in the platform to the second platform H^1, where it joins that which passes through the bars C^5. Here the slate is carefully picked out again by hand, and sent down the rock-shutes I^1, I^1, to the point I^2, where it is loaded into dumpers and hauled to the dirt- or rock-bank. The lump coal passes down the lump-coal shute I, I, to the point I^2, where it reaches such a level as will allow it to be loaded into the railroad-cars for market. After the slate has been removed at H, the coal is thrown down a hole in the platform to the steamboat rollers K. These rollers are cast-iron cylinders with large, strong teeth, which revolve toward each other at a speed of from 90 to 120 revolutions per minute, and the coal dropping between them is broken into pieces of various sizes. The two rollers are set so near together that none of these pieces shall be larger than steamboat coal. The coal passes from the roller K to the principal steamboat bars C^4, set 4½ inches apart, and all that will not go through them is steamboat coal, and goes to the steamboat shute G, whence it is loaded into the railroad-cars at G^1 in the same manner as is done with the lump coal at I^2, the same track answering for both. The coal which passes through

the steamboat bars C^4 goes to the prepared-coal rollers K^1, which are similar to the steamboat rollers, except that they have smaller teeth and are set nearer together, so that they produce no coal larger than broken. From these rollers the coal enters the main screens L, L, which are similar in construction to the counter-screens described above, except that they are larger. The dirt and pea and chestnut coals are taken out in the first three segments, and go together to the pea and chestnut screens L^1, L^1, L^1, which are double screens having a surrounding mesh outside the screen called a "jacket." All but the chestnut coal passes through the inner screen, the chestnut dropping out at the end, and the dirt passes through the jacket, while the pea coal drops out at the end of the jacket. The dirt drops into the dirt-hopper D^2, and is hauled to the dirt-banks; the pea goes to the pea-coal bins N^6, and the chestnut to the chestnut-coal bins N^5, without further preparation.

The next segment in each main screen separates the small stove, the next the large stove, the next the egg, and the broken coal falls out at the end.

All the coal but the broken passes, each size separately, over short "dusting-bars" M^7, set $\frac{3}{8}$ths of an inch apart, which remove the dirt made by attrition in the screens, and thence over the picking-floors M, M, which are so inclined that the coal slides over them by gravity, each size in its own compartment. These compartments are—M^8, M^8, small-stove picking compartment; M^4, M^4, large-stove picking compartment; M^3, M^3, egg picking compartment; M^2, M^2, broken picking compartment.

Across the picking-floors, seats, M^6, M^6, are placed at a slight elevation, so that the boys who pick the slate sit above the coal and separate the slate from it by hand as it passes them on its way to the bins. The slate picked out by the boys is collected in the slate-shutes M^7, M^7, and carried by hand to the dirt-hopper D^2.

The bins N, N, are divided into compartments for each size of coal, N^1, N^1, being the broken-coal bins; N^2, N^2 the egg-coal bins; N^3, N^3 the large stove-coal bins; N^4, N^4 the small stove-coal bins; N^5, N^5 the chestnut-coal bins; N^6, N^6 the pea-coal bins; N^7 the buckwheat-coal bin. When it is desired to load this coal into the railroad-cars, they are run down under the breaker to the gates O, O, communicating with each bin, the car-loaders using the platform P for convenience in walking from bin to bin. Below each of the gates O is a short set of bars, called the "lip-screens," over which the coal passes on its way into the cars, which take from each size all particles smaller than it, as well as the dirt caused by attrition in the bins. There are also similar bars at the lump and steamboat loading-points, I^2 and G^1. All this "loading chippings" and "dirt," as it is called, is brought to the hopper of the elevators R, R—the lump-coal chippings by means of the swinging trough S; the steamboat chippings by a trough not seen in the drawing; and the dirt from the lip-screens at O, O by wheelbarrows. It is then all elevated by the elevators R, R, and carried horizontally by the chain-carriers T, T to the bars V. That which passes over the bars goes to the so-called "monkey rollers," K^2, which are similar to the others described above, but smaller; while that which passes through goes directly to the elevators R^1, R^1. After passing through the monkey rollers, that portion goes also to the elevators R, R, and all together are elevated to the buckwheat screen W. All but the dirt and buckwheat coal passes through this screen and goes to the main screen L. The buckwheat passes through the screen and drops from the jacket to its proper bin N^7, while the dirt passes through the jacket and goes to the hopper D^2.

This completes the distribution of all the coal. It will be observed that in all the operations advantage is taken of the elevation of the tips A, A above the railroad-tracks to cause the coal to pass from one process to the next continuously by gravity; and the elevations necessary to do this are reduced to a minimum by covering the shutes and traversing floors with sheet iron, which soon becomes highly polished.

The machinery is all moved by the stationary engine at K, with its belt and shaft connections. The daily output is 525 tons of prepared and lump coal: 77 boys and 15 men are employed solely in separating the impurities from it.

This breaker is not offered as a model filling every requirement of a breaker in the best manner now known, but simply as exemplifying the process of preparing coal for market now generally in use.

The different sizes are—lump, as it comes from the mines; steamboat, that which passes through bars from 4 to 7 inches apart, and over 4-inch screen-mesh; broken or grate, that which passes through 4-inch mesh, and over $2\frac{3}{4}$- to $2\frac{1}{2}$-inch mesh; egg, that which passes through $2\frac{3}{4}$- to $2\frac{1}{2}$-inch mesh, and over $2\frac{1}{4}$- to 2-inch mesh; large stove, that which passes through $2\frac{1}{4}$- to 2-inch mesh, and over $1\frac{7}{8}$- to $1\frac{1}{2}$-inch mesh; small stove, that which passes through $1\frac{7}{8}$- to $1\frac{1}{2}$-inch mesh, and over $1\frac{1}{8}$- to 1-inch mesh; chestnut, that which passes through $1\frac{1}{8}$- to 1-inch mesh, and over $\frac{5}{8}$- to $\frac{1}{2}$-inch mesh; pea, that which passes through $\frac{5}{8}$- to $\frac{1}{2}$-inch mesh, and over $\frac{3}{8}$- to $\frac{1}{4}$-inch mesh; buckwheat; dirt. These dimensions vary with the nature of the coal.

The following table shows the result of passing through the "monkey" or smaller rolls 2000 pounds of coal, "broken" size. The experiment was made at the Kalmia colliery with coal from the Lykens Valley beds. The first two columns show the size of openings in the screens by which the coal was separated after passing through the monkey rolls:

Mesh. Over.	Through.	Weight.	Size.	Percentage.	
2½-inch.	3-inch.	364 lbs.	Egg,	18·20	18·2
2 "	2½ "	659 "	Stove,	32·95	
1½ "	2 "	364 "	"	18·20	56·8
1¼ "	1½ "	113 "	Small Stove,	5·65	
⅞ "	1¼ "	136 "	Nut,	6·80	6·8
½ "	⅞ "	84 "	Pea,	4·20	4·2
¼ "	½ "	84 "	No. 2 Pea,	4·20	4·2
	¼ "	196 "	Dirt,	9·80	9·8
				100·00	100·0

These figures show that nearly 10 per cent. of good coal is ground into dust, and so lost, in going through the breaker.

THE WASTE OF ANTHRACITE.—The preparation of anthracite coal is attended by great wastage in every stage of the operation; the loss in breaking by the crude toothed rollers generally used is not less than 25 per cent. of the clean, merchantable coal taken from the mines; and at many of the collieries, where softer and more friable coal is mined, the waste is as much as 40 per cent. At the screens a further small percentage of loss is sustained. When the broken coal enters the screen the angles are all sharp, but these are soon rounded by the rotary movement, and much of the coal's efficiency for rapid combustion is lost. The loss in preparing anthracite amounts to about 45 per cent, and the total

Col.
Hard V
North Mahanoy
Mahanoy City.
Elmwood .....
Ellangowan....
West Shenando
Boston Run.....
Conner .....
Hammond .....
Preston No. 3....
Girard. .....
Ivo-burn.
Tunnel. .....
Potts.....
Keystone.....
Locust spring
Mount Carmel
Sham
Burnside. ....
North Franklin
Pot-e-fit and burnite.
Pine Forest ...
Wadesville Sh..
Beechwood .....
Mine Hill Gap
Pottsville Min
Thomaston.....
Glendower.....
Red-and-Wh
Otto ....
Phœnix Park N
Lyken
West Brookside

losses in min
per cent. of
wastage has
tury, without
resting upon

The followin
superintendent
the mechanical
ration, and in
losses in prep

Tonnage, Dec. 1,
Material hauled
Of which there w
" "
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" mule
Number of wa
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Lowest monthly
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This colliery is located
extensions of the First or S
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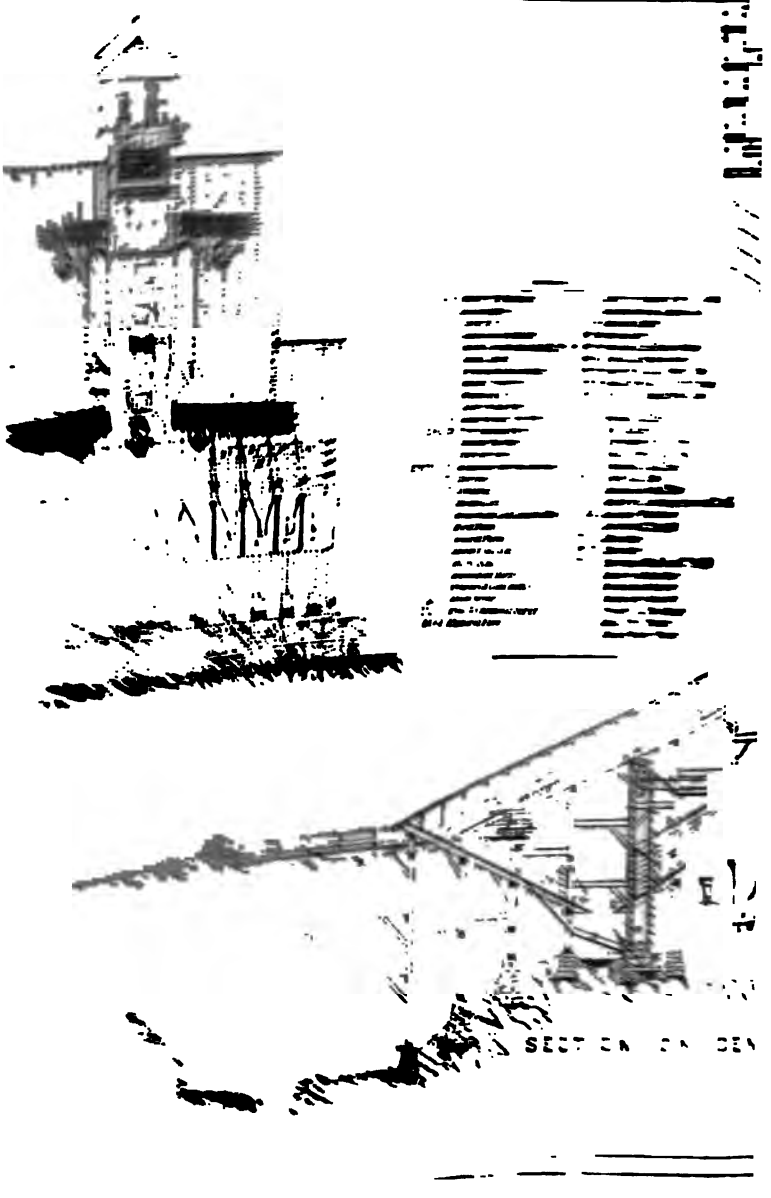
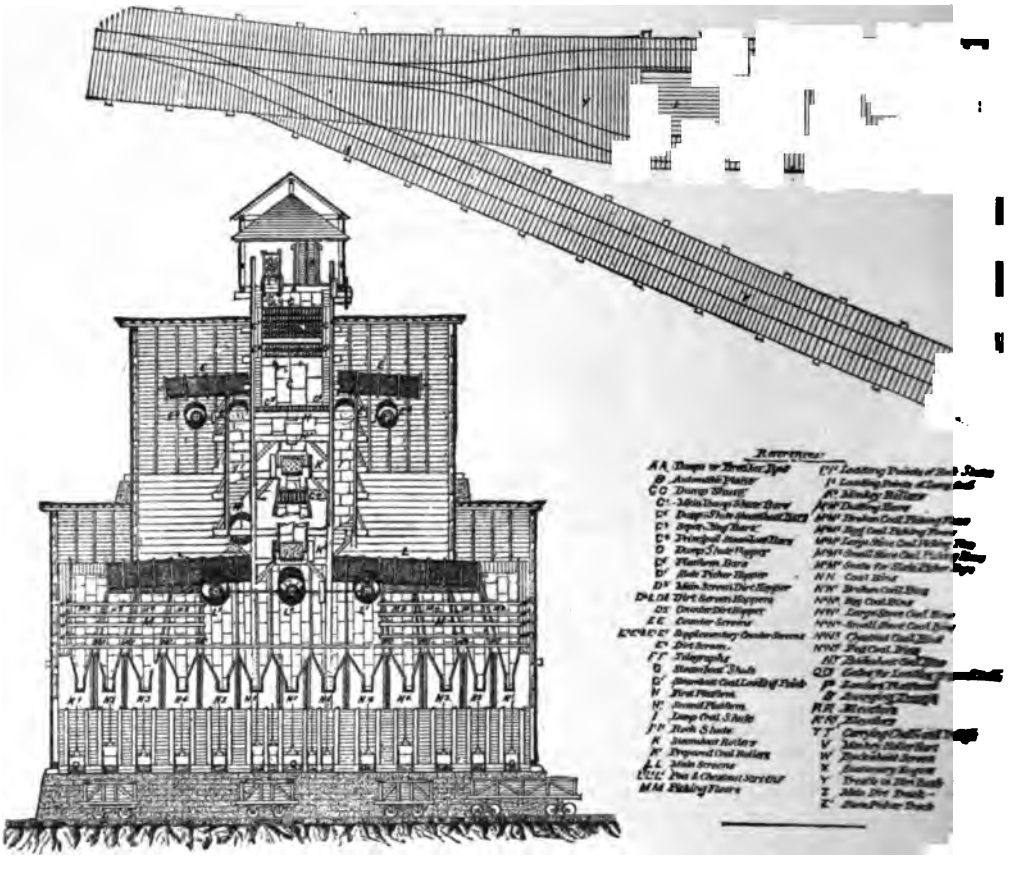
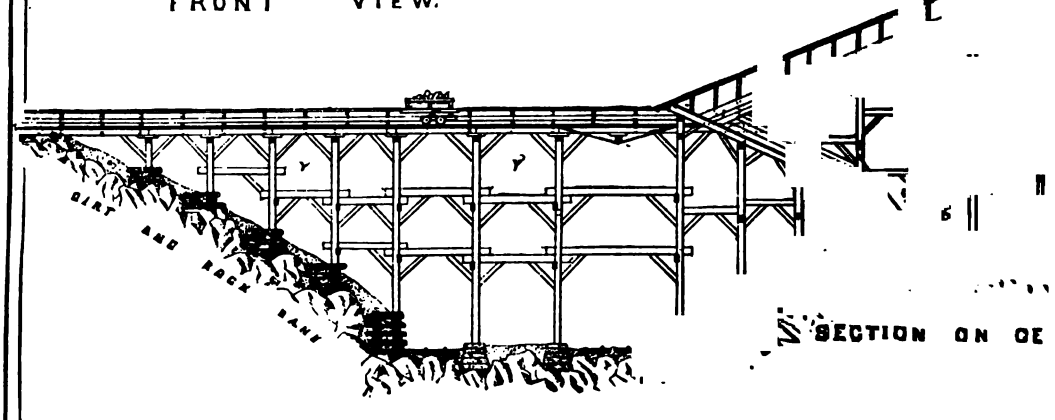


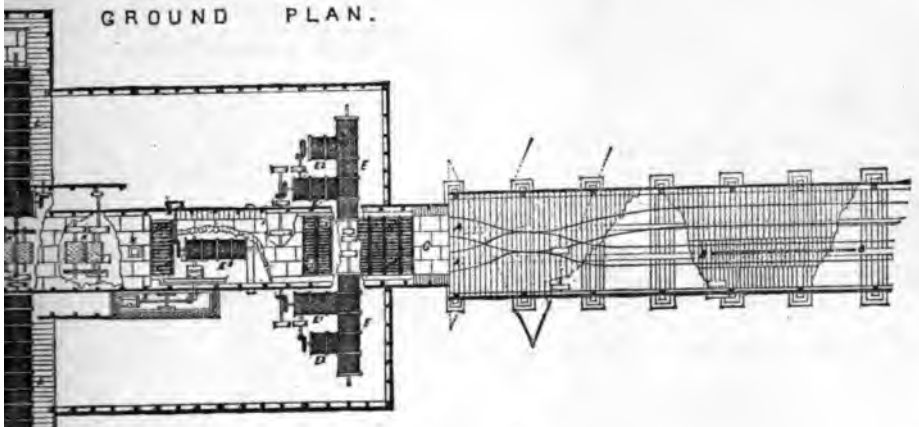


FRONT VIEW.



SECTION ON CE

GROUND PLAN.



PLAN OF THE

HAMMOND COLLIERY BREAKER

ON THE

City Girard Lands

FROM THE REPORT OF THE DIRECTORS OF

CITY (PHILAD^A) TRUSTS.

BY HEBER S. THOMPSON

Engineer of the Girard Estate

POTTSVILLE, PA.

BREAKER.

from the breaker at much expense, and depos- in mounds which gradually extend over several of ground and rise to a height of from 25 to or even more. These mounds often take fire, spontaneous combustion or from ignition, and burn slowly for years, no attention being paid to the fire unless it approaches so near the breaker or other buildings as to menace their safety. Numberless experiments have been made with the costly and intrinsically valuable material of which these mounds

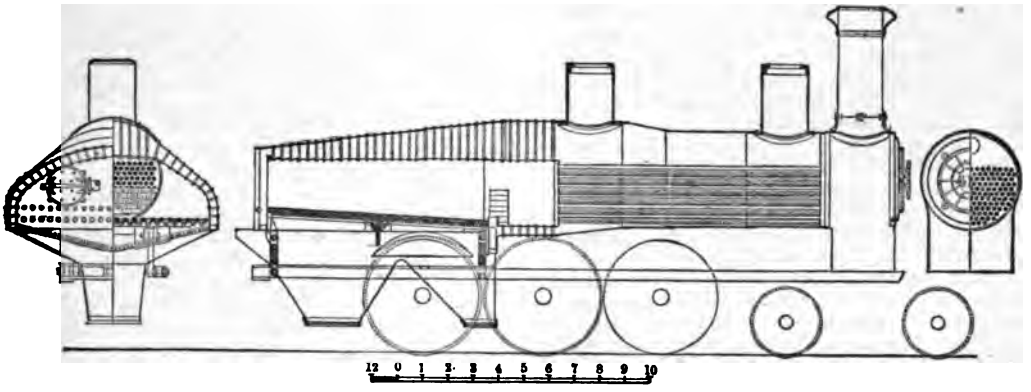


FIG. 44.—Coal-dirt-Burning Engine.

aposed, but, though several processes have been d by which it can be used as a fuel, they are all re to enable the culm to compete with the f coal in the market. All these processes culm with clay, refuse petroleum, or some other e which gives it adhesive power, and then make blocks. Mr. J. E. Wootten, general manager Philadelphia and Reading Railroad Company, an invention by which he is enabled to burn culm in its natural state. The essential features of his plan are a very wide area of grate-surface in the combustion-chamber, and a strong draft, promoted by introducing exhaust steam from the engine. (See fig. 44.) The grate-area in locomotives using this device is nearly three times that of the ordinary locomotive fire-box, and the distribution of air over so large a surface has the effect of keeping the small particles of fuel quiescent until they are consumed, instead of carrying them

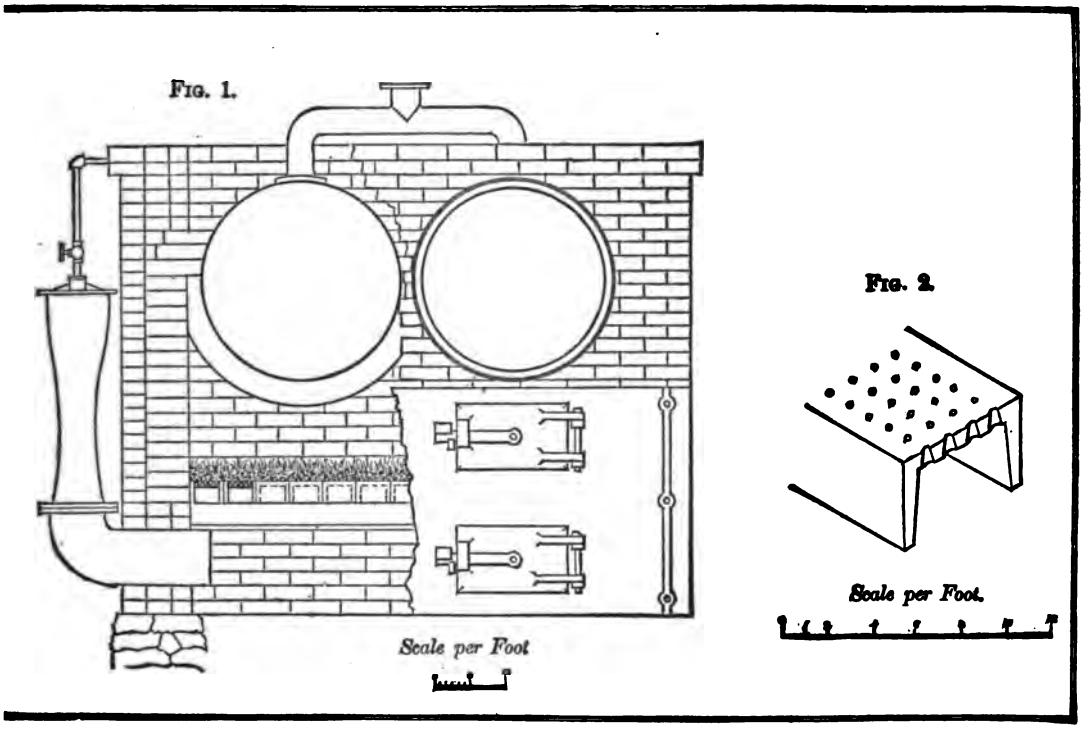


FIG. 45.—Anthracite Coal-dirt-Burner in Stationary Boiler Engine.

out of the smoke-stack, as would be the case with the draft of the ordinary locomotive. The consumption of culm in the Wootten furnaces exceeded 150,000 tons in 1881, and is rapidly increasing. Mr. Wootten's patent has been applied to a large number of the Philadelphia and Reading Company's locomotives, and has been adopted to some extent on other roads; but the fine culm is found not to work well in the rapid service required of passenger engines. These are accordingly supplied with the smaller sizes of prepared coal, while coal-dust is still burned in the furnaces of freight locomotives and stationary engines.

Many collieries now use culm in their own furnaces. (See fig. 45.) The fire-boxes are floored with a plate of perforated iron, and a steam-jet is used to increase the draft, while the loose dust is dampened before being thrown into the furnace to prevent its flying about and being carried out of the smoke-stack. With this simple preparation it is shovelled into the furnace just as it comes from the culm-bank—slate, rock, refuse, and good coal intermingled. It is said to make a hot fire and give perfect satisfaction. A report of the Philadelphia and Reading Railroad on the use of locomotives supplied with the Wootten furnace shows that for the six months ending May 31, 1882, their use resulted in a direct saving to the company in fuel of $94,500, and that, although the tons hauled one mile during the same period exceeded the performance of the corresponding period to the extent of 66,000,000 tons, or about 15 per cent., the cost of fuel used by all engines for the six months was $51,000 less than for the corresponding period in 1881. The saving in cost of transporting 100 tons one mile during the six months ending May 31, 1882, compared with the same period in 1879, when there were no engines of this pattern in service, was $17\frac{5}{10}$ per cent.

The writer has recently seen coal-dirt direct from the mines of Altoona in Pulaski co. Va. (anthracite), used under the boilers of five out of six salt-furnaces at Saltville, Washington co., Va., where it is used very successfully, one ton of coal-dirt, costing $1.85 at the salt-works, doing the work of one cord of wood, costing $4 at the same point, and each making from 45 to 50 bushels of salt per ton or cord. The same coal, burnt in larger pieces, is used to run the locomotives on the branch railroad from Martin's Station on the Norfolk and Western Railroad to the Altoona mines, 8½ miles, some of the grades of which are 242 feet per mile.

Comparative Cost of Mining.—In the anthracite districts it formerly was the practice to cut the land into mile lengths, each section being perhaps one-fourth of a mile wide. A slope and tunnel would open two, three, or more beds, which were worked to the extent of the mile limit and to a depth of, say, 100 yards. This being exhausted, the slope was sunk another 100 yards, and so on to the bottom of the coal-basin or the limit of the land. Four such collieries in an area of 800 or 1000 acres was not an uncommon sight, and the average capacity of each was from 50,000 to 100,000 tons per annum, with a plant costing perhaps from $100,000 to $300,000. By one plant costing one-fourth less, the same amount of coal could have been mined at about one-fourth the cost, including salaries of superintendents, mine-bosses, clerks, office-rent, and other expenses. The large companies are now working their own mines on the latter plan. Prof. Raphael Pumpelly, in charge of the mine statistics of the census of 1880, gives the following data to show the comparative profit of working mines on a large scale. (See Table LX.) His figures are compiled from the returns of 187 mines in Ohio and 100 in Indiana, each group being divided into four classes. The first class includes mines using only manual labor; the second, collieries using no steam-power, but employing animals; the third, mines using steam with less than 100 horse-power boiler-capacity; the fourth, mines in which the boiler-capacity exceeds 100 horse-power:

Table LX.

Class.	Number of mines.	Average annual production, net tons.	Average cost of labor per ton.	Average wages per day.	Average product per man per day.	Per cent. of value of product paid for labor.	Per cent. of value of product paid for materials.	Per cent. of value of product for profit, interest, repairs, and royalty.
Ohio, No. 1	12	832	$0.93	$1.23	1·33	59·10	7·47	33·43
" No. 2	88	23,500	.77	1.27	1·64	68·42	10·57	15·01
" No. 3	78	27,300	.96	1.42	1·49	69·34	10·86	19·80
" No. 4	9	44,990	1.03	1.70	1·66	66·13	10·95	22·92
Indiana, No. 1	12	817	.87	1.25	1·44	64·00	5·00	31·00
" No. 2	36	3,991	.84	1.57	1·88	56·00	14·60	29·40
" No. 3	48	23,839	.97	1.50	1·55	65·00	7·00	28·00
" No. 4	4	30,654	1.11	1.64	1·48	73·00	7·00	20·00

Prof. Pumpelly's deduction from these figures is that, "as a general rule, the mines employing capital most liberally can afford to yield to labor a larger share of the value of the product, since their profits depend on the volume of their business. They also employ more skilled labor. It is believed that these features run through the entire mining industry."

American Coal-Leases.—American mines are leased by the ton of 2240 pounds in the anthracite districts, and by the bushel in the bituminous mines, the rate being in Pennsylvania 76, in Indiana 70, and in Kentucky, Illinois, and Missouri, 80 bushels per ton; the prices vary in different localities. The operator takes a lease from the land-owners for fifteen years, erects his own improvements, pays a royalty of about 25 cents per ton, and is generally obliged to mine 50,000 tons per annum. More recently higher prices are given—say 40 cents per ton for all coal above chestnut size, 20 cents for chestnut, and 10 cents for pea. This refers to private operators in the anthracite region. The report of the Girard Estate lands, belonging to the City of Philadelphia, shows that from their ten collieries, in 1881, were mined 1,354,850 tons, which paid them in [illegible] $412,603.60, or an average of 30½ cents per t[illegible] product from this valuable estate, si[illegible] ing with one colliery in 1863, aggre[illegible] tons to Jan. 1, 1882. The rentals have [illegible] form, however, in this instance: they [illegible] cents per ton, and increased, as t[illegible] ton per year. The term of five y[illegible] short to open and work a colliery.

TABLE LXI.—*Comparative Cross-Sections of English and American Anthracite and Bituminous Coals.*

Bituminous Coal, New Castle District, England.			Anthracite Coal, Southern Coal-Field of Pennsylvania.			Bituminous Coal, Pennsylvania.	
	Ft.	In.	Sand Rock.	Ft.	In.		Ft.
Closing Hill Bed	1	8	Red-Ash Coal Bed	3	0	Washington Bed	3·25
Strata	450	0	Strata	...	...		
Hebburn Fell Bed	2	8	Gate Vein Coal Bed	7	0	Two smaller coal-beds.	
Strata	250	0	Strata	...	...		
Five-quarter Bed	4	0	Little Tracy Bed	3	0	Waynesburg coal-bed	4·00
Strata	260	0	Strata	...	...		
Three-quarter (Black Close)	2	0	Big Tracy Bed	6	0	Uniontown Bed	2·50
Strata	50 to 180	0	Strata	...	...		
1. High Main coal	6	0	Diamond Bed	6	0	Sewickley Bed	3·00
Strata	33 to 150	0	Strata	...	...		
2. Metal coal	1	6	Little Orchard Bed	3	0	Red Stone Bed	2·50
Strata	33	0	Strata	...	...		
3. Stone coal	1	6	Big Orchard Bed	6	0	Pittsburg Bed	9·00
Strata	60 to 100	0	Strata	...	...		
4. Yard coal (variable)	2	10	Primrose Bed, gray-ash	10	0	Six smaller beds.	
Strata	60 to 100	0	Strata	...	...		
5. Bensham coal	2·5 to 5	0	Holmes Bed, white-ash	5	0	Freeport, upper bed	4·00
Strata	78	0	Strata	...	...		
6. Five-quarter coal	3	0	Seven-foot Bed, white-ash	7	0	Freeport, lower bed	3·00
Strata	48	0	Strata	...	...		
7. Low Main or Hutton coal	6	0	Mammoth Bed, white-ash	25	0	Kittanning, upper bed	3·00
Strata	30 to 100	0	Strata	...	...		
w coal (inconstant)	2	10	Skidmore Bed, white-ash	6	0	Kittanning, middle bed	2·50
trata	24	0	Strata	...	...		
Five-quarter coal	3	8	Buck Mountain Bed, white-ash	9	0	Kittanning, lower bed	4·00
Strata	30	0	Strata	...	...		
Ruler coal	1	10	Upper Lykens Valley Bed	8	0	Clarion Bed	2·50
Strata	96	0	Strata	...	...		
Townley or Harvey coal	3	1	Lower Lykens Valley Bed	3	0	Brockville Bed	3·00
Strata	42	0	Strata	...	...		
Jetty coal	2	2				One small bed.	
Strata	42	0					
8. Stone coal	2	5				Quakertown Bed	2·00
Strata	18	0					
Five-quarter coal	3	4				Sharon Bed	2·50
ata	30	0					
9. e-quarter coal	2	6				Mercer Bed	2·50
ata	54	0					
ckwell coal	2	11					
Total thickness	215	11	Total thickness of coal	107	0	Total thickness of coal	53·25
20 beds, from 1 ft. 6 in. to 6 ft., av. 3 feet.			15 beds, from 3 ft. to 25 ft., av. 7·0 feet.			16 beds, from 2·50 to 9 ft., av. 3·33 feet.	
Total thickness of coal 60 feet.			The total thickness of these measures is about 2600 feet.				

The comparison of English and American bituminous coals is quite significant.

therefore extended to the usual term of fifteen years. At the expiration of these leases they are renewed to the same or other lessees.

The several railroad companies which own most of the anthracite coal-lands mine their own coal, and do so, if not more cheaply, certainly better, than individual operators, who endeavor only to get out the most and best coal at the cheapest rate, neglecting the smaller and inferior coals, which are never reclaimed, but help to make up the aggregate of the fearful loss per acre of American anthracites. A better plan of leasing would be to adopt the system of some English landlords, who lease their lands by the acre for so much per foot of thickness. This plan ensures accurate surveys and ... of the mines and constant and close inspection ... vision of all workings, so as to recover all the ... ble, and at the same time keep the mine in ... working condition.

... in mining, especially in bituminous beds, in ... should ... be greater than, or possibly not so ... in ... mines, for the reason that our beds ... (see LVI.), are often above the nat... and are, as a rule, nearly horizontal; they are readily accessible, do not require much timber for propping or roof-supports, and are easily and cheaply ventilated and drained,—all of which are grand elements for cheap and large production of coal.

Unquestionably, the better mode of mining is to develop large areas by large collieries, having extensive machinery for hoisting coal, pumping water (the latter especially, as many more tons of water than of coal are hoisted), ventilating, etc.; the improvements being so located as to mine all the coal in the largest available area—one colliery doing the work more cheaply than could be done by placing several collieries in the same area, thus cutting up the work and multiplying the machinery.

DRAINING DEEP MINES.—One of the most costly and difficult operations at a colliery working below water-level, is the removal of the water which constantly accumulates, and which often flows into the mine in enormous quantities. A great many plans of pumping-engines have been devised, the object of each being the removal of the water in the shortest time and at the least expense. The one figured in the illustration, Allison's isochronal pumping-engine (fig. 46), which is

coming into extensive use in anthracite collieries, is one of the best of these, and is given as a representative of its class. Its leading and peculiar features are the cataract and the self-governing device. The combination of these secures results that justly entitle it to the characteristic name of "isochronal," or equal spaces in equal times; for the strokes of the piston are all equal in length and are made in equal times, not being affected by variations in the steam-pressure or in the resistance against which the pump is working. In all pumping operations the variations of steam-pressure and of load or resistance are frequent and unavoidable, and in many instances have been attended with disastrous results. The isochronal not only neutralizes their effects, but also secures other advantages of great value. The movements of the main steam-valve are automatically graduated and controlled by means of the cataract, so that the speed of the piston is reduced as it nears the end of its stroke, which allows the valves to seat themselves quietly and gently, and permits the moving column of water to come to a gradual and easy rest. The cataract consists of a cylinder with a passage from one

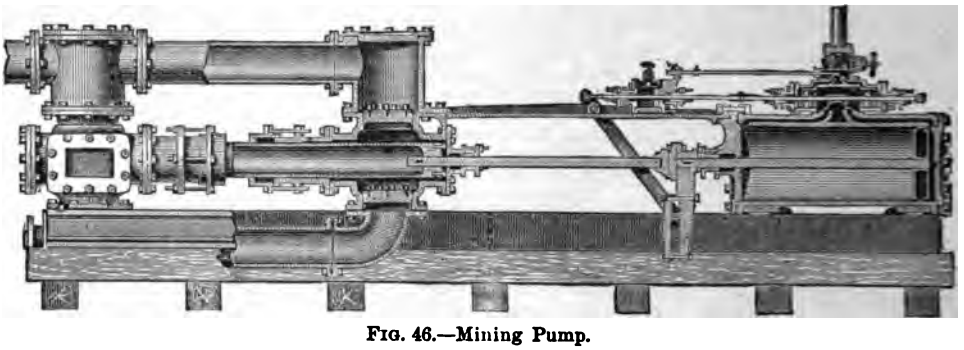


FIG. 46.—Mining Pump.

end to the other. In the centre of this passage is a valve, which makes it possible, when desired, to shut off the communication between the ends of the cylinder. The cataract cylinder is filled with oil, and the passage of the oil from one side of the piston to the other is regulated by the valve. The main slide-valve is moved by steam-pressure on two pistons mounted on the valve-rod, and the motion is controlled by the oil in the cataract cylinder. The oil has to pass from one side of the cylinder to the other while the pump on the main piston is making its full stroke. The time required to pass the oil is regulated by the valve in the passage of the cataract cylinder. If the valve is closed, so that it will take one minute for the oil to pass, the pump will make only one stroke in that time. This governing feature is accomplished by the oil pressing against the piston and retarding the movement of the main slide-valve, thereby letting into the main piston just the quantity of steam necessary to give the pump the number of strokes the cataract-valve is set to give. The advantages obtained by this movement are—

First. The speed of the piston is automatically slowed down at the end of its stroke, giving time for the column of water to come gradually to a rest, and for the valves to seat gently and quietly, avoiding all concussion, jar, or the slightest tremor.

Second. The speed of the engine can be adjusted as desired under any pressure, and automatically maintained. Should it be working under full head of steam and against a heavy pressure, and the pressure be instantly removed, the speed would continue unchanged.

Third. The piston works to the end of its stroke under all pressure, avoiding the great waste of steam incident to the piston falling short of its stroke several inches, as is the case with all other direct-acting pumping engines working under variable loads.

LABOR IN THE ANTHRACITE MINES.—A summary of the data collected by the Census Bureau on the labor in anthracite collieries in 1880 is as follows:

Number of men above ground	15,564
Number of men below ground	36,952
Number of boys above ground under 16 years of age	11,921
Number of boys below ground under 16 years	3,592
Total employés	68,029
Of whom miners number	19,555
Of whom laborers number	47,419
Of whom administrative force number	1,944
Per cent. of total force, miners	28·7
" " " boys	23·0
" " " laborers and boys	69·5
" " " administrative force	1·8
Total wages paid	
Average yearly income of man	
Average monthly income of man	
Total number of months worked by one man	
Total number of months of enforced idleness	
Total number of months lost in strikes	
Per cent. of year worked	
Per cent. of year lost by stoppages, etc.	
Per cent. of year lost in strikes	

The wages given above signify net wages, b figures on the pay-roll, less the sum the m obliged to spend for powder, oil, etc.

Mr. T. D. Jones, mine inspector of the of Luzerne and Carbon counties, Pa., in l the following figures on the rates of w liery hands in the Wharton (Skidmore) o-four ed the Mammoth, 30 feet thick, in 1880, the advancing and declining at the rate of 10 per every dollar rise and fall in coal above or belo ton at the tide-water delivery-point. From A August, both included, the price remained the as it did also from September to December, l cluded:

TABLE LXII.

Prices.	Basis Rates.	Jan'y and Feb'y.	March.	April to Aug.	Sept. to Dec.	Mean.
Wharton Bed.	$	$	$	$	$	$
Price of coal in market...	...	3.50	4.00	4.50	4.50	4.2166
Rate per cent. added or deducted.	...	.15 off.	.09	.07	.05	.0783
Gangway, per yard.....	4.59	3.90	4.18	4.27	4.36	4.23
Air-way, per yd. (25 sq. ft.).	3.06	2.60	2.78	2.85	2.91	2.82
Cross-cut, per yard.....	2.30	1.96	2.09	2.14	2.19	2.12
Opening breast.....	8.50	7.23	7.74	7.91	8.08	7.84
Gangway, per yd. ("B" vein, 12 feet thick).	4.05	3.87	4.14	4.23	4.32	4.19
Price pr. 2½-ton car ("B" bed).	.944	8.03	.861	.878	.897	.871
Price per 2-ton car ("D" bed, 8 feet).	.97	.825	.883	.923	.922	.894
Price p. ton Wharton bed.	.415	.413	.441	.451	.461	.447
Mammoth Bed.						
Price of coal in market...	5.00	3.50	4.10	4.30	4.50	4.28
Rate per cent. added or deducted.	...	.15 off.	.17	.18	.18	.17
Gangways timbered, p. yd.	6.12	5.20	5.37	5.67	5.81	4.64
" not "	5.34	4.54	4.87	4.93	5.07	4.92
Chutes, per yard.....	2.87	2.44	2.61	2.67	2.73	2.64
Cross-cuts, per yard.....	1.91	1.62	1.74	1.78	1.81	1.76
Air-ways, p. yd. (25 sq. ft.).	3.25	2.76	2.96	3.02	3.09	3.00
Cross-holes from gangway to air-way.	3.83	3.26	3.49	3.56	3.64	3.53
Price, per ton (48 cubic feet per ton).	.425	.36	.385	.395	4.05	.392
Miners, per week.....	12.60	10.71	11.47	11.72	11.97	11.62
Miners' laborers, per week (first class).	10.80	9.18	9.08	10.04	10.26	9.95
Miners' laborers, per week (second class).	9.90	8.42	9.01	9.21	9.41	9.13
Gangway laborers, pr. wk.	11.53	9.80	10.49	10.72	10.95	10.62

Schuylkill Basis Wages [from Report of Mine Inspector].

Engineers, per month	$60.00
Firemen, per week	9.50
Blacksmiths, per week	11.00
Carpenters, "	$9.00 to 12.00
Outside men, "	9.00
Platform men, "	9.00 to 10.00
Dump-chute men, per week	8.00
Dirt-bank " "	9.00
Car-loaders, " "	11.00 to 13.00
Slate-pickers (boys), "	2.50
Slate-picker boss, "	9.00
Starters (inside), "	10.50
Loaders, per week	10.00
Miners, "	11.70 to 15.00
Drivers, "	10.00
Contract price, per yard, for driving gangway.	5.50 to 11.00
" " " " " tunnels	20.00 to 50.00
" " " wagon for cutting coal	.50 to 1.25

This table was adopted in 1875 as a basis on which to predicate wages, which rise above or fall below it according to a rule agreed upon by the miners and their employers.

The number of fatal *accidents* which occurred in the mines of Ohio during the twelve months from Nov. 15, 1879, to Nov. 15, 1880, was 22. Taking the output of the mines from June 1, 1879, to May 31, 1880—namely 6,437,725 tons—for comparison, there was 1 life lost in the mines for every 292,624 tons of coal mined. In 1874 there were 30 fatal accidents in the mines of Ohio, while the output for that year, being 3,267,585 tons, made the death-list 1 fatal accident to every 108,919 tons mined. The same year the reports of the British inspectors of mines showed 1 death for 134,251 tons mined.

THE SAFETY-L[AMP].—This is an illuminating appa[ratus] or mines, [con]cted as to obviate the dangers [of] l light is needed in places [where] coal-mines accumula[te] ake place; this gas, explosive, and fearful accidents have resulted from the use of ordinary lamps in such places. The earlier contrivances to effect illumination without danger were clumsy and imperfect. In 1813, Dr. W. R. Clanny, and in 1815, George Stephenson and Sir Humphry Davy, each invented, independently, true safety-lamps. Davy made a number of experiments upon the nature of the gas escaping from coal-strata, and on the conditions of its union with atmospheric air. One of the greatest dangers in mines arises from the recklessness of the miners, and in the construction of safety-lamps precautions have to be taken against this, as against more obvious perils. Davy's lamp consists of a closed cylinder of gauze made of wire from $\frac{1}{10}$th to $\frac{1}{60}$th of an inch in diameter, with twenty-eight wires to the inch. Over the closed top is fitted a lid like a pill-box cover, fitting closely around, but not closely down over it, and so leaving between the two gauze tops a sort of air-chamber, which protects the upper lid from excessive heat. The cylinder should not exceed 1½ or 2 inches in diameter, or the volume of gas within will be sufficient to induce explosion. Three strong vertical wires extend up the outside of the cylinder and unite above the lid, where a handle is attached; beneath is secured a common lamp. Stephenson's lamp has a glass cylinder inside the wire one, and within the upper portion of the glass is a metal chimney perforated with small holes; this forms the double lid. The light is brighter than Davy's, and steadier; the glass, while it intercepts no light, prevents flaring from air-currents; if the glass breaks, it still leaves a wire-gauze lamp, though of rather too large diameter. The Clanny lamp has an extinguisher suspended above its flame; when the flame burns up too high from an excess of fire-damp, the wire which sustains the extinguisher melts; it falls and puts out the dangerous gas-flame, leaving a small and safe oil-flame, sufficient to light the miner away from the dangerous spot. It seems to be agreed generally that the gauze cylinder should be accompanied by one of glass—the gauze to ensure against fracture, and the glass to ensure against air-currents, and so secure a clear and steady light. There is a lamp invented by a Belgian named Mueseler, and called after him, which is of more recent date than any of the above; and the report of a commission in Belgium caused the Government to render the use of this lamp in that country compulsory. It varies from the Clanny, which it most resembles, by having within it a horizontal gauze, surmounted by a metal chimney, which is found in practice to add considerably to its safety.

A safety-lamp may remain in a stationary or slow-moving atmosphere of explosive gas for a considerable time with safety; but when the speed is accelerated the danger is increased; thus, a Davy lamp explodes when submitted to a speed of 6 feet per second; Clanny, 8 feet; Stephenson, 10 feet; Mueseler, from 15 to 20 feet, according to the dimensions of the outlet of chimney and the position of lamp, but it is necessary to pass the flame into the upper portion of the gauze. This excessive heat is produced by the oxygen being forced into the heart of the flame, much in the same way as the fire is raised by means of a blower, a bellows, or blast.

May we not anticipate the time when the electric light can be introduced into our mines and carried to the several workings, wherein a wire can be laid to which small globes of glass can be attached by other smaller wires—such a plan as Edison suggested at the meeting of the mining engineers at the Franklin Institute in Philadelphia in 1880?

COAL-DUST EXPLOSIONS.—The influence which may

be exerted by deposits of coal-dust in mines upon the magnitude of fire-damp explosions, to which attention appears to have been directed by the observations of Faraday and Lyell in 1845, was made the subject of some experiments in France in 1867 by M. Verpillena, who came to the conclusion that coal-dust plays an important part in coal-mine explosions. The subject was further and more fully examined into in France, by the aid of experiments on a small scale, by M. Vital in 1875, in connection with an inquiry into the nature and cause of an explosion which occurred in the preceding year in the Campagnac colliery, and in a part of that colliery where no fire-damp had ever been detected. On this occasion an examination for gas had been made by the overman with the Mueseler lamp just before firing a "shot" or blast. After the first shot a second hole was charged; the fuse having been ignited, the men retreated, when, after a few seconds, a violent explosion occurred, and the men saw a large body of red flame advancing upon them. After examining the nature of the dust collected in the mine, and instituting some special experiments upon a very small scale for the purpose of ascertaining whether and to what extent the flame from a small charge of powder was lengthened when projected, like the flame from a blown-out shot, into air containing fine coal-dust in suspension, M. Vital concluded that very fine coal-dust, very rich in volatile (inflammable) constituents, will take fire when raised by an explosion, and that portions of the coal are successively decomposed, yielding explosive mixtures with the air, whereby the fire is carried along; the intensity or violence of the burning being much influenced by the physical characters (fineness, etc.) of the dust. He also pointed out that an explosion of fire-damp, while taking place almost instantaneously, inflames or decomposes a small quantity of coal-dust raised by its explosion, and that explosive action is thus propagated when the fire-damp explosion ceases. Soon after M. Vital's investigation of the subject, Mr. W. Galloway commenced a series of valuable experiments upon a larger scale, with the view of investigating the influence of coal-dust in colliery explosions; and the results were communicated by him to the Royal Society in two papers in 1876 and 1879. The conclusions to which Mr. Galloway was led by the experiments described in his first paper were to the effect that a mixture of air and a particular coal-dust which had been made the subject of chemical examination and practical experiment was not inflammable at the ordinary pressure and temperature, but that the presence of a very small proportion of fire-damp in the air, the existence of which could not be detected with the Davy lamp by the most experienced observer, rendered this dust inflammable, and caused it to burn freely with a red, smoky flame. From this it was inferred that an explosion, when originated in any way whatever in a dry and dusty mine, may extend itself to remote parts of the workings where the presence of fire-damp was quite unsuspected.

In the experiments with coal-dust it was shown that as small a proportion as about 2 per cent. of fire-damp in air, in currents travelling at a moderate velocity (600 feet per minute), may be brought to ignition by coal-dust; or, what amounts to the same thing in regard to the result, that small proportions of fire-damp may be instrumental in determining the ignition of, and the propagation of flame by, coal-dust.

In some experiments made in currents of very low velocity (100 feet per minute) with the most sensitive of the coal-dust used in these experiments (from Leycett colliery), it was found that when a mixture containing only 1·25 per cent. of gas, charged with the dust, reached the naked lamp-flame, the latter became surrounded by a large fringe of flame filled with incandescent dust-particles. When the proportion of gas was increased to 1·5 per cent. a long flame was at once produced, which soon increased to a large flame, and after a short interval the mixture of dust and air with this small quantity of fire-damp burned from end to end of the gallery.

The most sensitive dusts, which were also the richest in coal and the finest, produced explosive mixtures with air containing only 2·5 per cent. of fire-damp. The next to these in order of sensitiveness, and not greatly different from them, also followed next in order, both as regards richness in coal and fineness; but the one next following, and differing but little in sensitiveness from the preceding one, was the dust which chemical examination showed to be poorest in coal (containing nearly half its weight of non-combustible constituents). This dust, though not so uniformly fine as the preceding samples, was very uniformly suspended throughout the air-current which conveyed it; 2·75 per cent of fire-damp being sufficient to produce with it a mixture which was exploded by the lamp-flame. Of the other six samples, four ranked closely together, being less sensitive than those already referred to. These were different from each other in regard to richness in coal and the proportions of very fine dust which they contained. Lastly, there were two samples decidedly less sensitive than these; they did not present any very marked difference from one or other of the preceding four samples in point of richness of coal, but they could not be so plentifully and uniformly suspended in the air-current as the others. These six samples all formed, more or less readily, explosive mixtures when suspended in air containing 3 per cent. of fire-damp.

FIG. 47.

MINE LOCOMOTIVES.—The accompanying engraving represents the "Pine-knot" engine, for use in coal and other mines. This one is but a representative of the many of its kind now used in the anthracite and bituminous coal districts of Pennsylvania, and even finding their way into the gold-mines of the Pacific coast. Horse-power for draught purposes is rapidly giving place to these little engines, the latter being much the cheaper, because doing a vast deal more work than horses could do in a given time. The following description and work of the style of engine named in this article is from a report made by Mr. W. H. Wallis, superintendent of the Bald Mountain Gold-mining Co., Cal., to the Baldwin Locomotive Works of Philade ia, Pa., where the engine was built. He says: "T gine is employed in a tunnel 4000 feet in le which is a track of only 20-inch gauge. rails, and having grades, some of which

set per mile. The tunnel is 4 feet wide at the and for 18 inches up; thence it tapers to 2½ feet top. The extreme height from level of rails to tunnel is 5½ feet. The track has curves of from 150 feet radius. Small four-wheeled cars, having 12 inches in diameter and a wheel-base of 20 and which weigh 750 pounds each, and can two tons each, are used on this track. The ven- s obtained from air-shafts and air-warp, with- blowers or furnaces, the current of air moving rate of about four miles per hour. We can 5 of our cars, with 80 men and 10 loads of tim- material, up our grade and into the mine, the trip in five minutes, or at the rate of 9 per hour. We can bring out 18 loaded cars with ne alone, with the use of the brake which we e. We have no brakemen. We use an- coal, and find no deleterious effects from steam on our ventilation. Our air-shaft is sunk 2000 om the mouth of the tunnel, and is in two com- ents of 3½ feet square each. At the top we drop ches of water into the centre of each compart- which forces a strong current of air down the and through the air-ways, giving the air to the men first, and carrying off the steam and what as is generated from the coal. We have already a saving of more than the cost of the locomotive ttending expenses in the working of the mine. ollowing is a statement of six days' work, which ir comparison with all of the work:

h of haul, 3800 feet.	Grade, 166 to 220 feet per mile.
t of cars, each, 750 lbs.	
-base, 20 inches.	Diameter of wheels, 12 inches.
ch carry, 2 tons.	Gauge of track, 20 inches.

oads of gravel taken out per week, 2936 = 5872 tons.

Expense.

4370 pounds of anthracite coal	$87.40
Engineer's wages	48.00
Head-lights, oil, and tallow	4.10
Total	$139.50

er car-load, 4¾ cents = 2¾ cents per ton. Distance ot including switching, 200 miles. Mule-power costs per load; man-power costs 21 cents per load.

engraving (fig. 47) represents an engine having e cylinders, which require a width of gangway 32 greater than the gauge of the track. The No. 4 also built by the Baldwin Locomotive Co., has ide cylinder, requiring a width of gangway 16 greater than the gauge of the track. The little knot" engine stands upon the track with the ing dimensions: cylinders, 8 by 12 inches; diam- f driving-wheels, 24 inches; wheel-base, 3 feet es; tank-capacity, 110 gallons; weight in work- rder, 15,000 pounds; height, 61 inches; width cylinders, 46½ inches; width across tank, 39

-LOCOMOTIVES *vs.* MULES.—Thomas H. Phil- erintendent of the Kalmia Colliery in the anthra- -regions of Pennsylvania, furnishes the following s the basis of the comparative cost and expense of mine-locomotives and their substitution for mules:

There are three locomotives of the Baldwin inside-connected class (class 4, 10 C.), a style used on account of the narrowness of the gangways. The cost of expenses for repairs is estimated, as the repairs were made at the colliery, and no account kept. For each locomotive an engineer is employed, also a boy to turn switches and couple and uncouple cars. The colliery is opened by a water-level tunnel. The distance from the mouth to the end of the run of the locomotive is 3 miles, making a round trip of 6 miles. The time consumed for each trip is one hour and forty minutes, including stoppages and shifting. The daily consumption of coal is 1097 pounds for each locomotive, and the average number of mine-cars hauled by each locomotive daily is 133, the number at each trip varying from 18 to 26. Their capacity is 2½ tons of coal each. Steam-pressure averages 105 pounds.

The average expense per day for each locomotive is—

Coal	$1.35
Oil, waste, packing, etc.	.70
Repairs and renewing, estimated	.60
Wages of engineer and boy	3.33
Total	$5.98

per 133 cars, or 4·5 cents per car for 3 miles; 1·5 cents per car per mile, or $\frac{6}{10}$ of a cent per ton per mile for every ton of material hauled out.

The average cost per ton for hauling by mules is estimated. Supposing that everything is arranged for mule-hauling, with no delays and an average speed of 2½ miles per hour kept up, including transfers, for 10 hours per day, with an average of 2 mine-cars to each mule, and the teams composed of six mules each, there would be required to do the work of the three locomotives 48 mules and 8 drivers, or an average of 16 mules for every locomotive. It is estimated that at this colliery a mule cannot be cared for, fed, shod, and harness kept in repair for less than 83 cents per day, including replacement of mules from death and loss by accident.

Using this estimate, the average daily expense would be

Keeping 16 mules, at 83 cents	$13.28
Drivers ($1.70 per day for 6 mules)	4.53
Oil and cotton	.40
Total	$18.21

for 133 cars, or 13·69 cents per car for 3 miles; 4·56 cents per car per mile, or 1·82 cents per ton per mile for every ton of material hauled.

This estimate would make a saving of 9·19 cents per car in favor of the locomotives; $12.23 for each locomotive, or $36.69 for the three locomotives daily. This excludes the larger outlay that would be required for mine-cars and turnouts, and the increased expense of keeping the roads in repair for the travel of so many mules. Ninety-two cars are required to do the work with locomotives, and to do the work with mules would require 124 cars. The outlay for 16 mules and harness would about offset the cost of a locomotive.

(P. W. S.)

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COAST AND GEODETIC SURVEY. One of the recognized duties of the national government is to facilitate foreign and interstate commerce along the coasts, by promoting the safety of navigation by every means in its power. To secure this end a detailed survey of the coast is of primary importance, and the maps embodying the knowledge gained by it serve as the basis of reference for all collateral facts of importance to the navigator; nor must their manifold uses to the general government be lost sight of, as for instance, in planning works for defense, for the improvement of harbors and for protecting them against undesirable changes from natural causes whose effects become manifest only by the comparison of surveys made in the lapse of years.

A survey of so large an extent of coast, furthermore, involves the use of a method to which that practised in surveying small areas is no longer applicable; it becomes necessary to take into account the figure of the earth, in order to correlate the surveys of different localities, and therefore it is both desirable and necessary to make them on a uniform plan.

The United States Coast Survey may be said to have had its beginning in 1807, when Congress, on the recommendation of President Jefferson, passed an act authorizing the President to cause a survey of the coasts of the United States to be taken. The act requires that in this survey "shall be designated the islands and shoals, with the roads or places of anchorage, within 20 leagues of any part of the shores of the United States; and also the respective courses and distances between the principal capes or headlands, together with such other matters as he may deem proper for completing an accurate chart of every part of the coasts within the extent aforesaid." It further declares that it shall be lawful for the President to extend the examinations to St. George's Bank, and any other bank or shoal, and the soundings and current observations beyond the above limits to the Gulf stream.

In reply to a circular issued by Albert Gallatin, Secretary of the Treasury, inviting an expression of opinion of scientific men as to the best method of conducting the proposed survey, Ferdinand Rudolph Hassler, a Swiss by birth, submitted a plan for a trigonometric survey, and to him was intrusted the duty of organizing it. For this task Hassler was eminently fitted by his previous experience in conducting a trigonometric survey in Switzerland: by thorough knowledge of the best scientific appliances of his day, by a far-sightedne[ss] him to make his work conform rigorously [to] admitting of all the extension required by the quently increased scope of the work, and by domitable courage with which he encountered opposition, born of ignorance, to his plans. [When] he undertook the organization there were not in United States either the workshops to make necessary scientific instruments nor men [of] their use. He therefore went to Europe [to] tend the construction of instruments, but, [on] the political exigencies of the tim[e] abroad, his return was delay[ed] an[d] [the] begun, in 1817, in New York [City], to [be] almost immediately thereafter by [the] [Con]gress to provide funds for its contin[u]

Owing to the pressing deman[d] [for] the inadequacy of various attempts [to]

direction of the Navy Department to conduct necessary surveys, after the suspension of the Coast Survey, Congress in 1832, upon the recommendation of the Secretary of the Navy and others, recurred to the law of 1807, and the survey was again placed under Hassler's charge, and under the administrative direction of the Treasury Department, under which it has remained ever since. Hassler, under the title of Superintendent, continued to direct the work until his death, which occurred in 1843. He left the work well advanced between Narragansett Bay and Cape Henlopen, and the survey efficiently organized in all its varied detail. Previous to his death, but in the same year, a board of civil, naval and military officers was convened by the President in compliance with an act of Congress to submit a plan for the reorganization of the survey. This board adopted the scientific methods proposed by Hassler, as the basis of the reorganization, and recommended the continuance of the survey under the Treasury Department. The plan submitted forms the legal basis of the present organization.

Hassler was succeeded by Alexander Dallas Bache, under whom the survey reached its fuller development. Recognizing at once the necessity for an increased scale of operations, he began surveys in many different localities, adapting the work to the different climatic conditions found on the extended coast, by pushing it forward in the south during the winter, and in the north during the summer, and extending it, upon the acquisition of new territory, to the coast of Texas and California. These surveys in widely different localities were all conducted on a common system which ultimately will unite them into a harmonious whole. He instituted systematic observations of the tides, and began a magnetic survey of the coasts and extended the hydrographic explorations into the Gulf stream. During his administration, which was a period of rapid development of the country, the important duty of recommending favorable sites for light-houses was assigned to the survey as part of its regular function.

Two of the most important adjuncts to modern geodesy were introduced and perfected at the very outset of Bache's superintendency, namely, Talcott's method of determining latitudes and the telegraphic method of determining longitudes; refinements were introduced in every branch of the work, which made rapid and admirable progress until it was in great measure interrupted by the civil war. During this period the efforts of the Coast Survey were mainly directed towards a co-operation with the naval and military authorities by constructing military maps and making surveys, and by utilizing the personal knowledge which its officers possessed of the southern coasts, by assigning them to special duty with the naval squadrons.

Under the pressure of his arduous labors the health of Bache gave way, and during a lingering illness of about two years, beginning in 1864, the duty of directing the conduct of the survey devolved upon his principal co-laborer, Assistant Hilgard.

Upon the death of Bache, Benjamin Peirce, the eminent mathematician, was appointed to succeed him in February, 1867. He continued the work according to the methods and plans of his predecessor, and began the extension of the main triangulation to the interior so as to connect the triangulations of the Atlantic and Pacific coasts. The success of this undertaking (not yet completed at the time of writing), in addition to fulfilling its primary object, will contribute this country's fair share to our knowledge of the figure of the earth, hitherto entirely derived from the labors of other nations, and will serve as a basis or connecting link of such trigonometric surveys of the country as the progress of time will inevitably make necessary.

By special enactment of Congress a survey of Lake Champlain was undertaken and completed, and upon the purchase of Alaska a reconnoissance of its coast was immediately begun, and has been continued from time to time in greater detail ever since. In February, 1874, Carlile Pollock Patterson, for many years previously connected with the survey as Hydrographic Inspector, was appointed to succeed Peirce and superintend the work until his death, in 1881. In recognition of the extension of the surveys into the interior directed by Congress, that body in an act of 1879 and thereafter used the designation Coast and Geodetic Survey. The death of Patterson was followed in December of the same year by the appointment of Julius Erasmus Hilgard, the present Superintendent.

Methods.—For an elucidation of the principles involved in the operations of extended surveys, the reader is referred to GEODESY in the ENCYCLOPÆDIA BRITANNICA. We purpose here merely to give an account of their application in the conduct of this work. The basis of this survey is a series of main triangles, having sides as long as practicable, carried along the whole line of the coast and connected at proper intervals with base lines measured by the most approved means which modern science affords. At numerous favorable points of this main series, observations are made for latitude, longitude and azimuth. Series of smaller triangles based upon the lines of the primary triangulation or upon independent base lines connected with the primary triangles, furnish points for the topography and also, in connection with the latter, for the hydrography or soundings.

The unit of length adopted in this work is the meter. The particular standard representing the meter to which all measurements have been referred is an iron bar known as the Committee meter. It is one of a number of similar bars whose length was ascertained in the construction of the original meter, by comparison with the toise, in 1799. Its relation to the French standard is perfectly known. Tralles presented it to Hassler, who brought it to this country in 1805.

The first base line was measured by Hassler with an apparatus involving a mode of measurement which has been recently revived in Europe. The apparatus consisted of three microscopes arranged in stands in line of the base. A combination of iron bars, forming a single bar 8 meters long, was made to measure successively the distance between the microscopes by the optical contact of a spider line stretched across a hole in the end of the bar, and another fine line, visible beneath it, on the tripod carrying the microscope. The objectives of the microscopes were each composed of two half lenses of different foci, by means of which the images of the spider line and other line referred to were centered in the eye. This apparatus was superseded by a very elaborate, compensating one designed by Bache. Although it is possible to ascertain the co-efficient of linear expansion of a metal with extreme accuracy, it is very difficult to find out, within the limits of accuracy required, what the temperature of a metal bar is under such circumstances

as are presented during base line measurement. It is the object of a compensating apparatus to secure invariability in length of the measuring bar during changes of temperature.

In the one under notice, two bars, one of iron and one of brass, are firmly united at one end and left free to expand at the other. The cross-sections of these bars are so proportioned to their conducting powers and specific heats that their changes of temperature go on at the same rates under different exposures. The compensation is secured by the arrangement of a lever at one end, fastened to the brass and pivoting on the iron. The long arm of the lever is connected with a small rod having a contact plane of agate. At the other end the bars carry a contact level and abutting rod with an agate knife-edge. The bars are enclosed in a spar-shaped tube which is supported on trestles admitting of adjustment in height, inclination and alignment. There are two such tubes, each 6 meters long, and the measurement is made by bringing them successively into contact, which is determined by the position of the bubble of the delicate contact level. The performance of this apparatus has been tested by the measurement of many base lines, and particularly of the one near Atlanta, Ga., which was measured twice in winter and once in summer under extreme differences of temperature, with results yielding great accuracy but showing at the same time that the compensation is not perfect. Recently another compensating apparatus, composed of zinc and steel bars, 5 meters long, has been constructed and used in the measurement of a base line in California. It is also a contact apparatus, contact being effected by screw motion, and judged by the coincidence of lines on a principle designed originally for the non-compensating apparatus intended for the measurement of base lines of secondary importance.

It may be remarked in regard to the different forms of measuring apparatus used in the survey that the merely mechanical part of measuring can be performed with any of them with all the requisite accuracy, that the difficulty of finding the true temperature of the bars while measuring remains the chief source of error, and that the degree of accuracy attained is as great as can be maintained in any system of triangulation depending upon the bases. To illustrate the accuracy achieved, it may be instanced that, taking into account all sources of error, the uncertainty of any one result of the three measures of the Atlanta Base is only about one inch.

The base measurements serve rather as a verification of the connecting triangulation than conversely, but as a remarkable instance of the results of the general refinement of the methods employed in both operations it may be stated that, in a portion of the main triangulation of the Atlantic coast, the computed lengths of the common line of junction 29½ miles long, situated midway between two bases 600 miles apart, of two independent systems of triangulation, differed only about half an inch.

The angles of the primary triangulation have been measured with theodolites, whose graduated circles are from 12 to 30 inches in diameter, and the preference is now given to this class of instruments with circles of from 18 to 24 inches in diameter, over repeating circles, which have also been used.

The sides of the primary triangles are generally as long as the configuration of the country will admit, and vary from comparatively short lines in flat country to long ones such as connect by a single step, the Contra Costa Mountains with the Sierra Nevada Mountains in California reaching a length of 169 miles. To render the stations visible at such great distances, heliotropes with mirrors 7 inches in diameter were employed to reflect the sunlight in the direction of the observer. On short sides, signal poles or other marks are erected and observed upon. Night signals, consisting of oil lamps and magnesium lights, have also been used, but not very extensively.

The altitudes of the stations are determined by trigonometric methods consisting of observations of zenith distances made with vertical circles, supplemented by micrometric observation made with the powerful telescopes of the theodolites, to determine differences of zenith distance. In addition to these observations a line of precise levels has been commenced, and it is intended that it shall connect the tide-waters of the two oceans; at present it extends from the Atlantic to within a short distance of the Mississippi River.

The direction of the triangulation with reference to the meridian is determined by azimuth observations. These are made with the theodolites used for the measurement of horizontal angles, by observations on one or more of the following stars, κ, λ, δ and 6 Ursæ Minoris and 51 Cephei, and generally only one reference mark is used. The observations are combined so as to eliminate either errors of chronometer time and right ascensions when observing the stars near culmination, or errors of declination when observing them at elongation. Another refined method often practised is to use the ocular micrometer of a transit instrument to observe the transits of circumpolar stars over the thread of the micrometer at equal distances from, and on both sides of, the line of collimation, and to refer the observations to a mark placed either in the meridian or in the vertical plane of the observed star's elongation. The average probable error of a determination of an azimuth and its connection with the triangulation derived from observations at 48 stations along the Atlantic coast is a little greater than .3 second of arc.

The different instruments for determining latitudes, tried in earlier years, such as vertical circles, repeating-reflecting circles, the zenith sector, and the method of prime vertical transits, were all superseded by the zenith telescope in its application to the method invented by Captain Andrew Talcott, U. S. A., prior to 1836, first used in the Survey in 1846, and afterwards remodelled and improved for the purposes of the work.

The method consists in measuring with a micrometer the differences of zenith distances of stars culminating within a short time of each [illegible] at nearly the same altitudes, on opposite [illegible] the zenith. In more recent years the use of the [illegible]th telescope as an independent instrument [illegible] gradually abandoned, and in its stead the [illegible] transit is used, which, by a simple modification, [illegible] addition of a delicate level and ocular micrometer, [illegible] by making either the stand or the telescope reve[illegible] has been adapted to the purpose of latitude de[illegible]ns.

The accuracy of modern [illegible] the latitude of any [illegible] comparative e[illegible] with great any other known [illegible]od, within one-

In 1846, also, t[illegible] tele[illegible] and [illegible] gitudes was for the fi[illegible]

history of Geodesy, and soon after, the chronograph, for recording time by means of the electro-magnet, was originated as an accessory part of such determinations. The first telegraphic difference of longitude actually observed was that between Philadelphia and Washington, Oct. 10, 1846.

By the introduction of this method it became possible to determine the amplitude of latitudinal arcs with a degree of precision which before had only been reached in the measurement of meridional arcs, and thus a new element was introduced in geodesy and astronomical science. Its application was immediately extended, and on the laying of the first Atlantic cable, the difference of longitude between Cambridge, Mass., and Greenwich, England, was successfully determined in the fall of 1866, and subsequently two other determinations through two new cables were made, the last of which involved the difference of longitude between Paris and Greenwich, which was then, by that expedient, for the first time determined with a degree of accuracy commensurate with its importance.

Previous to the laying of the Atlantic cable, every means known to science was exhausted by the Survey to determine the difference of longitude between Europe and America; to this end a large number of comparable observations of eclipses, occultations, and moon culminations, made abroad and in the United States, were collected and reduced, and as the co-operation of astronomers had been enlisted for this purpose, the science of astronomy received a stimulus to which it owes much of its progress in this country. In addition to the purely astronomical methods invoked, chronometric expeditions were organized and carried out by the survey on an unparalleled scale between the years 1849 and 1855, and it is worthy of note that the subsequent telegraphic determinations confirm the greater reliability of the chronometric over the astronomical results.

In telegraphic longitude determinations, as in all work of precision, it is always deemed necessary to secure a check on the accuracy of any result which has been obtained, and for this reason the method of procedure is so arranged that, if any two stations have been determined from an initial point, the resulting difference of longitude between the two new stations is checked by an independent series of observations made directly between them. In this way the reliability of a longitude determination made by the Survey has been tested, and it has been found that the uncertainty of such a result is only about .03 of time.

Bearing in mind the limits of uncertainty of the results of the different processes here described, it will readily be perceived that if the astronomical observations made at one station are referred to and compared with those made at another, any gross discrepancies must be ascribed to some cause not inherent in the methods used. Such discrepancies, however, are found and are ascribed to local irregularities in the form and density of the earth, which manifest themselves by the difference between the observed and computed direction of the plumb-line, and for this reason it is essential to make the observations at numerous points so that abnormal deflections may be distinguished by comparison.

When the triangulation is finished in any particular locality, and the latitudes and longitudes of the points have become known, they are plotted on a suitably prepared sheet of paper having on it a polyconic projection of the meridians and parallels covering the area to be mapped. These points then form a frame-work which unites and properly relates the topographical survey of one locality to that of another. The topographer by means of a plane table fills in the details of the map by representing the features of the country by certain conventional signs. The elevations or depressions are shown by contour lines or curves of equal elevation. The topography extends as far inland as necessary for the purposes of navigation or coast defence. The scales on which these maps are drawn in the field vary, but two are used in general on which the distances on the map are represented respectively by the .0001 and .00005 of the actual distances.

The duties of the hydrographer are analogous to those of the topographer in completing the required detail of the map. It is his province to explore the bottom of the sea by sounding its depth, to develop the channels and discover hidden dangers, and to lay down his observations in their proper places on the map for which the triangulation and topography have furnished the frame-work. He must note the currents and their changes in direction and velocity with the ebb and flow of the tide, and the assistance they may render or the danger they may cause to ships.

By means of angles measured, between objects on shore whose position is known, with a sextant at the place where a sounding is made, its relation to the rest of the map is determined. When, however, the work extends far seaward and out of sight of land, resort is had to the methods of determining a ship's position at sea known to navigators.

It is not only deemed requisite to determine the depth, but also the character of the bottom, and to this end appliances for bringing up specimens are attached to the sounding lead. By a system of abbreviations of words denoting the nature of the bottom, its characteristics, as determined by the sounding, are represented on the map. The information thus conveyed often enables the navigator to determine his position or to select a suitable anchorage. As the depth varies with the height of the tide, the soundings are referred to a particular stage of it, namely, to mean low water; and the depths at this stage are given on the map expressed in fathoms, and in shoal places in feet. The measurement of moderate depths is effected with comparative ease, but great difficulties were encountered in the beginning when the profound depths of the ocean off the coast were to be determined, as was the case in the explorations of the Gulf stream undertaken by Bache. The art of deep sea sounding was in its infancy when the Gulf stream explorations were begun in 1845, and the methods employed were necessarily tentative. But it was that period of experimental work which contributed largely to the improvements made more recently in the methods and appliances of deep sea sounding.

The greatest difficulty formerly encountered in sounding was the friction on the sounding rope due to the great pressure of the water; this has been overcome by the introduction of suitable wire. The capabilities of modern methods as applied and perfected in the survey are illustrated by the complete survey of the Gulf of Mexico, whose greatest depths, between 12,000 and 13,000 feet, were sounded out with unerring accuracy; at the same time the temperature at those and intermediate depths was ascertained.

The importance of the Gulf stream as a hydrographic feature of the Atlantic coast led to the explo-

rations referred to above. Its characteristic feature is the higher temperature of its waters over those of the surrounding ocean, and on this fact the explorations to determine its limits were based. At different points in its course lines of soundings were run across it at right angles to the supposed axis of its current, and the temperature of its waters was observed not only at the surface, where atmospheric influences might affect the temperature and vitiate the conclusions, but also at various depths below, where the phenomena were supposed to be free from such fluctuations.

Reference has already been made to the reduction of all soundings to a common plane of reference, namely, that of mean low water. For the purpose of making these reductions, observations are always made while the soundings are in progress, at stations near by, to determine the extent and times of the rise and fall of the tides. In addition, however, observations continued through many years, in some cases through a complete lunar cycle of nineteen years, have been made at selected stations along the coast for the purpose of studying the complicated laws which govern the tides on the coasts of the United States. For the purpose of recording the rise and fall of the tides a self-registering gauge is used. The apparatus consists of clock-work moving a sheet of paper, on which is traced a continuous line representing the successive stages of the tide, by means of a pencil which is moved by the rise and fall. As a result of these observations and investigations tide-tables are published annually by the Survey, in which are predicted the times and height of the tides at the principal ports of the United States, together with other data, by means of which the same information for all intermediate ports may be obtained.

The declination of the magnetic needle or variation of the compass is an element of great importance in navigation, and its amount is given on the charts. It varies in regard to time and place and has therefore been made the subject of special observations, and the laws governing its changes have been investigated by the Survey. Observations for declination, dip and intensity have been made at many points on the coast and in the interior with portable instruments, and a permanent observatory is maintained, with the co-operation of the University of Wisconsin, at Madison, in which the never-ceasing fluctuations of the magnetic needle are recorded by photography. Its own observations and those made by others have been collated and subjected to analysis by the Survey, and in consequence the direction of the needle can be foretold for the future and revealed for the past within certain limits. This latter fact, it need hardly be said, is of great value to land surveyors throughout the country. Charts showing the lines of equal magnetic declination have been published by the Survey.

Incidental but highly important results are brought out by the progress of the triangulation, namely, the measurement of terrestrial arcs. So far the following arcs have been completed: The Nantucket arc, extending from Farmington, Me., in lat. 44° 40′, to Nantucket Cliff, in lat. 41° 18′. The Pamplico-Chesapeake arc, from the head of Chesapeake Bay, in lat. 39° 35′ 5″, to Ocracoke Inlet, N. C., lat. 35° 04′. The two just mentioned are meridional; the most important, however, is the oblique arc, extending along the Atlantic coast from Calais, Me., in lat. 45° 11′, to Atlanta, Ga., in lat. 33° 45′, and having a length of 1200 statute miles. A discussion of these geodetic measures has resulted in the adoption, by the Survey, of the elements of the spheroid as deduced by Clarke, in place of those of Bessel, as most closely according with that portion of the earth's figure over which the triangulation has been extended.

The results of the work, of whatever kind, are forwarded to and discussed and published at the office of the Survey, in Washington, D. C. Annual reports are made by the Superintendent, which are communicated to Congress. They consist mainly of a review of the progress of the work during the year; a summary of the means proposed for promoting its efficiency; estimates for future progress, an abstract of work done in the field and office, with sketches illustrating the statements of progress. Professional and scientific papers relating to methods and results of the survey are usually appended.

A series of volumes containing full descriptions of the coast, the shores of the harbors, dangers, directions for entering harbors, with charts and views of the coast, is in course of publication under the title of *Coast Pilot*.

The charts, which are all drawn on a polyconic development of the earth's surface, are of two general descriptions, which may be distinguished as preliminary and finished. The preliminary charts are those which are issued as soon after the several surveys as is consistent with accuracy of general delineation, and are designed to supply the immediate and pressing demands of navigation. The finished charts embody all the information furnished by the Survey, including the minutest details. The two classes of charts differ in regard to the amount of the information which they furnish, but not in regard to correctness of that which is given. The charts are various in character, according to the objects which they are designed to subserve. The most important distinctions are the following:

1. Sailing charts, on a scale of 1:1,200,000, which exhibit the approaches to a large extent of coast, give the offshore soundings, and enable the navigator to identify his position as he approaches from the open sea.

2. General charts of the coasts, on scales of 1:400,000 and 1:200,000. These are intended especially for coastwise navigation, and are more general than

3. Coast charts, on a scale of 1:80,000, by means of which the navigator is enabled to avail himself of the channels for entering larger bays and harbors, and to recognize the beacons, buoys, and light-houses by their distinctive features and positions.

4. Harbor charts, on large scales, intended to meet the needs of local navigation.

It remains briefly to notice the fact that the first successful attempt to introduce uniformity and system into the weights and measures of the Union was made under the direction of Hassler, and that the highly important office of Weights and Measures has been continued under the care of the Superintendent of the Survey ever since. (O. H. T.)

COATESVILLE, a borough of Chester co., Pa., finely situated in the fertile Chester Valley. It is 38 miles W. of Philadelphia, on the Pennsylvania Railroad and on the Wilmington and Norristown Railroad. The former has here an iron bridge 900 feet long and 60 feet high. Coatesville has a national bank, a public hall, three hotels, two weekly newspapers, six churches, and eight schools. Its industries comprise seven iron-mills, a foundry, a tannery, two cotton and woollen

mills, paper-mills, a box-board-factory, two flour-mills, two planing-mills, and a carriage-factory. It is lighted with gas and has water-works. It was settled in 1820, and incorporated in 1857. The west branch of the Brandywine, passing through the town, affords good water-power. Its property is valued at $2,000,000, and its public debt is $100,000. Its population in 1880 was 2766, and in 1890, 3650, while the country around is closely settled.

COBB, HOWELL (1815–1868), a Georgia statesman, was born at Cherry Hill, Ga., Sept. 7, 1815. He graduated at Franklin College in 1834, studied law, and was admitted to the bar in 1836. He was elected by the legislature solicitor-general of the western circuit of the State. In 1843 he was elected to Congress, and soon became the leader of the Southern Democratic members. In December, 1849, after a prolonged contest, the Whig party proved unable to re-elect Mr. R. C. Winthrop Speaker of the House, and the Southern members united on Mr. Cobb, and elected him on the fortieth ballot. When Mr. Clay's compromise measures were introduced in 1850, Mr. Cobb supported them, and in 1851 was elected governor of Georgia in opposition to the extreme Southern party, which opposed the compromise. In 1855 he was again elected to Congress, and having strongly supported Mr. Buchanan for President, was made by him Secretary of the Treasury, which position he held till Dec. 10, 1860, when he resigned to take part in the secession movement. In February, 1861, he was chosen president of the Confederate Congress at Montgomery, Ala., but a year later retired on account of personal differences with Jefferson Davis. Though appointed a major-general in the Confederate army, he took no part in military affairs. After the close of the war he opposed the reconstruction policy. He died suddenly while on a visit to New York, Oct. 9, 1868.

COBBE, FRANCES POWER, an English philanthropist and writer on social, moral, and religious subjects, was born in 1822. She is descended from Richard Cobbe, who sat in Cromwell's Parliament in 1656 as knight of the shire for Hampshire, where the family has been settled for several centuries. Her father, Charles Cobbe, was lieutenant of light dragoons in the battle of Assaye, afterwards deputy-lieutenant and high sheriff for county Dublin, Ireland. Miss Cobbe was educated at Brighton. After the death of her father, in 1858, she was for many years engaged, in company with Miss Mary Carpenter of Bristol and other friends, in reformatory work, ragged-school and night-school work, the befriending of workhouse girls, and the relief of destitute incurable sufferers throughout England. She also made several journeys to Italy and the East, and then settled in London, where she has taken part in the agitation for woman suffrage. An effort to obtain legal separations for wives subjected to aggravated assaults was originated by her, and has been successful. Since 1876 she has been chiefly engaged in founding and directing the Victoria Street Society for the Protection of Animals from Vivisection, of which Lord Shaftesbury is president and Miss Cobbe secretary. They have succeeded in securing the passage of an act restricting the practice of vivisection. Miss Cobbe has been a frequent contributor to the daily press, as well as to the *Quarterly*, *Contemporary*, and *Fortnightly Reviews*, the *New Quarterly*, *Fraser's*, and *Cornhill Magazines*. Her first work was an *Essay on Intuitive Morals*, published in 1845, and republished in America. Her works on religious subjects comprise *Thanksgiving, a Chapter of Religious Duty* (1863), *Broken Lights, an Inquiry into the Present Condition and Future Prospects of Religious Faith* (1864), *Dawning Lights, an Inquiry concerning the Secular Results of the New Reformation* (1868), *Darwinism in Morals* (1872), *The Hopes of the Human Race, Hereafter and Here* (1874). She has also edited *Alone to the Alone, Prayers for Theists, by Several Contributors* (1871), and the *Collected Works of Theodore Parker*, in 12 volumes. On philanthropic and social subjects she has written *The Workhouse as a Hospital* (1861), *Friendless Girls, and How to Help them* (1861), *Female Education* (1862), *The Pursuits of Women* (1863), *Studies New and Old of Ethical and Social Subjects* (1865), *Criminals, Idiots, Women, and Minors*, a discussion of the laws concerning the property of married women (1869), and *Moral Aspects of Vivisection*, which has passed through several editions. She has also published, as results of her observations abroad, *Italics: Brief Notes on Politics, People, and Places in Italy* (1864), and *Cities of the Past* (1864). Among her later volumes are *False Beasts and True* (1875), *Re-echoes* (1876), *The Duties of Women* (1881). Her last works are *The Peak in Darien* (1882), an octave of essays on atheism, etc., and *The Scientific Spirit of the Age* (1889). Miss Cobbe is an incisive and suggestive writer, a vigorous supporter of the intuitive theory of morals, and a representative of the devout theism which finds no sufficient evidence of the truth of revelation.

COBET, CAREL GABRIEL, a Dutch philologist, was born at Paris, about 1813. He was sent to Holland by his father, and after studying at the Hague and at Leyden, travelled in Italy. In 1847 he became a professor at the University of Leyden, from which he received, for his works, the honorary title of doctor. In 1871 he was made Correspondent, and in 1876 Foreign Associate, of the French Academy of Inscriptions and Belles-Lettres. His works display great erudition. Among them are: *Prosopographia Xenophontea* (Leyden, 1836); *Observationes criticæ in Platonis comici reliquias* (Amsterdam, 1840); *Variæ lectiones qui bus continentur observationes criticæ in scriptores Græcos* (Leyden, 1854); *Novæ lectiones* (1858); *Miscellanea philologica et critica* (1873); with editions of Lysias and other Greek authors.

COBOURG, a town of Ontario, Canada, in Northumberland co., the county-seat of Northumberland and Durham counties, on the N. shore of Lake Ontario, 65 miles E.N.E. of Toronto. It is on the Grand Trunk and the Cobourg, Peterborough, and Marmora Railways; has fine town and county buildings, and is the seat of the University of Victoria College (Wesleyan). Cobourg has 2 banks, 2 newspapers, 8 churches, 10 schools, besides a collegiate institute and a county model school; also grist-mills, carworks, foundries, woollen and cotton mills, dye-works, and manufactures of matting, cards, etc. It is a handsome town, gas-lighted, and regularly laid out. Property valuation, $3,000,000; public debt, $200,000; yearly expenses, $32,000. Its port is artificial, and much iron-ore is here shipped. Population, 4957.

COCCULUS. The drug known as *Cocculus indicus* is obtained from a plant belonging to the natural order *Menispermaceæ*, of which there is in the United States a good representative in *Menispermum Canadense*, and in *Cocculus Caroliniensis* of the Southern Atlantic States. It has in modern times been divided from *Menispermum* and *Cocculus*, and forms a genus of this single species under the name of *Anamirta Cocculus*.

It is a native of Malabar, chiefly, where it is commonly known as *Natsiatam*. It is a strong climbing plant, having a stem as thick as one's arm, which is deeply coursed by numerous fissures. The leathery leaves are about 6 inches in diameter, and somewhat heart-shaped; and the short leaf-stalk is tumid at both ends. The male and female flowers are borne on separate plants. The female flowers are in somewhat compound racemes a foot long, from the axils of the upper leaves, and the fruit, which is first white, then red, and finally black, resemble bunches of small grapes. The drupe contains a single stone about the size of a pea, and it is from this the intoxicating material is obtained which has, for so many ages, made the plant famous. The venomous principle is known as *picro toxine;* and *Menispermine*, a powerful alkaloid, is found in the pericarp. The fruit is made into a paste with flour and water, and a little red lead to give it color; and when a small portion is thrown into the water, fish greedily eat it, and soon come to the surface floating back downwards, when they are easily caught by the hand. The powdered fruit is one of the best insecticides for infested hair. Up to the time of Linnæus this was all known of its value. In his *Materia Medica* he dismisses it in two words, "*pediculis—piscibus.*" Afterwards it was discovered that it could be used as a substitute for malt, in brewing, and immense fortunes were made by its use in "London Porter," until the fact was discovered, and its employment for that purpose interdicted by law. About 3 lbs. of the poisonous drug were used to about 300 lbs. of malt. The Colomba, Calumba, or Kalumba, root, as it is variously spelled, is obtained from the root of *Cocculus Palmatus*, a native of eastern Africa, and is a favorite tonic in the pharmacopœia. The American Columbo is the root of a gentianaceous plant—*Frasera Caroliniensis*, and its virtues are said to be equal to its African namesake. *Cocculus Peltatus*, *C. flavescens*, *C. platyphyllus*, and *C. Bakis* are used in the same capacity in various parts of the East Indies. In Arabia a spirit is distilled from *C. Cabatha*. The American *C. Caroliniensis* has a special reputation only as an ornamental plant. It grows with great rapidity, and is popular wherever free-growing vines are desirable. Its fruit hangs in bunches like red currants, and is particularly ornamental, but on account of the unisexuality, single plants seldom bear fruit under cultivation.

COCCYX (Gr. κόκκυξ, a cuckoo), the termination of the spinal column or back-bone, in man consisting normally of the last four vertebræ anchylosed together in adult life; the apparently single bone resulting from this fusion being likened in shape to a cuckoo's bill. The bones are much stunted and degraded vertebræ, scarcely exhibiting the processes and other points of structure of well-developed vertebræ, and not transmitting spinal nerves throughout. The human coccyx has normally one more bone than that of the gorilla, man being therefore more tailed than that ape; it is anchylosed or articulated with the sacrum, usually the latter, and more freely in the female than in the male sex; it is said to be freest during pregnancy, and to yield during parturition some little increase of antero-posterior diameter of the inferior strait of the pelvis. It gives attachment to several muscles and ligaments. Any bone of the coccyx is a *coccygeal* vertebra, and in animals with long tails the adjective is synonymous with *caudal*. In such cases the elongated bones are freely movable, are for the most part devoid of a canal for the transmission of nerves, and in general resemble both in form and function the phalanges of a digit; they are often reinforced on the under side by certain processes known as chevron-bones. The number ranges from about three to upwards of one hundred. In most birds, more or fewer terminal coccygeal vertebræ are enlarged and welded together into a peculiar coccyx called the share-bone, vomer or *pygostyle*, borne at the end of a number of less modified free caudal vertebræ, and serving for the support of the tail-feathers. (E. C.)

COCHIN CHINA. The interference of France in the affairs of Anam has called considerable attention to this hitherto almost unknown country; and French travellers and geographers have been industrious in collecting additional information respecting it.

The name Cochin China is strictly limited to a part only of the once powerful empire of Anam, which consisted of three very distinct regions; viz., Lower Cochin China, now in the hands of the French republic; Upper Cochin China, which contains the Anamese capital, and Tong-king, which is by far the most populous and most important of these countries.

RACES—*Anamites.*—The predominant race throughout is the Anamite, and is probably, like the Siamese and the Shan races, an offshoot from the Chinese stock. The Chinese emperor Yaon, who came to the throne B. C. 2356, sent the tribe of Hi to take the government of the country to the south of the Yang-tse-kiang, and kingdoms thus formed extended in B. C. 2208 to the south of Tong-king. The earliest dynasties of the Anamites and Shans are traced to Chinese imperial families, and their kingdoms were within the bounds of the empire before its earliest contraction. Successive waves of Chinese emigration appear to have swept over almost the entire Indo-Chinese peninsula, driving the aborigines to the mountains, and waging war against the opposing Malay element that met them in the south.

Intermixture with other races, and the lapse of many centuries, during which the surroundings have been diverse from those of the actual Chinese, have made of the Anamite a race as distinct from the former as is the German from the Anglo-Saxon. The true Anamites are of small stature, but possessed of great endurance, and with a full share of oriental duplicity. They are reserved and proud, repressing all outward show of affection. Timid by nature, they are yet capable of making an energetic resistance when well led, as was proved by the French in the war which resulted in the annexation of Lower Cochin China. Buddhists by profession, they are incapable of comprehending the refinements of that creed, and actually practise ancestor-worship to even a greater extent than do the less educated classes of the Chinese. Their reverence for tombs is very great, so much so that on the surrender of Lower Cochin China to the French it was made a condition that the tombs of the royal family of Nguyen should be kept in order by the conquerors. The father is absolute master of his wives and children, and marriages of the second order are frequent.

Every Anamite dish has for its basis a preparation of putrid fish, called nuoc-mam, the scent of which renders their thatched habitations unbearable to a European.

Mois.—Scattered among the forests of the mountains which separate the basin of the Me-kong from the cultivated lands of Anam are the tribes of the

Mois, apparently the remnants of an aboriginal people. Though socially below the level of the Anamites, these people have taller forms and in many respects nobler features than the predominant race, which, though it has driven them to the mountains, does not really rule them. The possession of a beard, and several other characters, suggest, in spite of their degradation, affinities to the Indo-European race. The Mois devote themselves to agriculture, clearing patches in the midst of the forest, at a distance from the cultivated lowlands of the Anamites, and also trade ivory, honey, skins, pepper, betel, etc., in exchange for other commodities. Occasionally they make a foray into Anamite territory, and carry away women and children, whom they sell in the markets of Laos.

Hoi.—Upon the lower slopes of the eastern side of the mountains, below the districts occupied by the Mois, dwells a people called the Hoi, few in numbers, with better developed limbs than the Anamites, and seemingly more energetic, but sunk to the lowest level of degradation. These are looked upon in the province of Binh-dinh (Upper Cochin China) as the last descendants of the Tsiampas, who figure so largely in Anamite history.

Laotians.—The Laos or Laotians are supposed to be of Chinese origin, and probably constituted one of the oldest of the swarms that emanated from Southern China. The name Lau or Lao signifies old. Independent Laotian tribes occupy a large portion of the hill-country, country of Tong-king, preferring poverty to submission to the exactions of the Anamite mandarins. The same race is master of the upper valley of the Me-kong, and occurs along the length of that river. The Laos are a rather good-looking, decidedly lazy race, raising only what is barely necessary to sustain them, and without aptitude for commerce.

Chinese.—Nearly the whole of Indo-China, wherever business can be transacted, swarms with modern Chinese. In their hands is all the commerce of the fertile delta of the Me-kong, they have seized upon the trade of Tong-king, and whatever is grown by Laos or Mois passes through their hands before it reaches the markets of the world. If Europeans traffic here, the Chinaman is the medium between them and the producer or collector. The Chinese trade in Tong-king is chiefly an illicit one, carried on by bands called the Black Flags, in the composition of which the elements of smuggler, pirate, and rebel enter in about equal proportion. No Chinaman can enter into the civil service of Anam, yet the Chinese bands are so numerous and so powerful that the Anamite governors bend before them.

History.—The Anamite annals show that for ten centuries the narrow strip of Upper Cochin China was the scene of a constant struggle between the Giaochi, from whom the modern Anamese are descended, and the Tsiampas, a race of sea-faring people, or rather pirates, whose headquarters was in the province of Binh-dinh, and whose chief port was the ancient Gia, the modern Thi-nai or Qui-nhon. The origin of the Tsiampas is not surely known, but probably they were Malays, possibly a colony from the Philippines. In spite of the continuous defeats and terrific slaughter which, according to Anamite annals, were regularly inflicted on the Tsiampas, their kingdom existed, though at ebb, in 1313. In 1377 they captured the Anaking by stratagem, and in 1405 received help China.

Le-loi, the great hero of Tong-king, was victorious over the Chinese; yet in 1470 the Tsiampa pirates pillaged more than ever the coasts of Anam. At that period Le-thanh-tong directed against them 100,000 men by sea and 160,000 by land, overran their country, and annexed it to Anam. In 1509 they attempted to regain their independence, but were definitively annexed in 1649. From this time until the eighteenth century the Anamite kings were undisputed masters of Cochin China and Tonquin, but at this date there was a division. The family of Nguyen, originally the governors of the southern provinces, became independent, and the governor of Tong-king also rebelled against his sovereign. At the end of the eighteenth century the Tay-son rose in the south, and the unfortunate Nguyen-anh was forced to fly to an island in the Gulf of Siam, whence he secretly returned, and, with a force of character seldom found in an Anamite, attempted to reconquer his kingdom. In this, with the aid of a few French officers, he finally succeeded, and added Tong-king also to his dominions. From this epoch the French have always had a hand in the affairs of Anam. The treaty of 1787 gave the port of Tourane and the archipelago of Pulo Condor to France. It was not till 1801 that the citadel of Binh-dinh fell into the hands of the Anamite king, who during his life, grateful to the French for the assistance they had rendered him, continued friendly to them, but who counselled his successor Minh-Mang to get rid of such dangerous allies. An era of persecution of native Christians and massacre of French and Spanish missionaries succeeded, and resulted in the capture of Saigon in 1859 by 800 French and Spaniards. The Anamite forces immediately blockaded them, and it was not until additional troops arrived that the lines of Ki-hoa were carried. Peace was made in 1862, and part of Lower Cochin China was annexed, but the three western provinces were still in the hands of the Anamite king, and insurrections were frequent. The light boats or sampans of the Anamites did them good service. In 1867 these insurrections were put down, chiefly by the aid of light-draught gunboats that could traverse the canals of the Me-kong delta, and Admiral de la Grandière succeeded in adding the remaining three provinces to the French colony. A treaty signed in 1863, by the same admiral, gave France the protectorate of Cambodia.

French relations with Tong-king date from the forcible ascent of the Red River by M. Dupuis in 1872. M. Dupuis had been a confidant of Mâ, then all-powerful in Yunnan, and was commissioned by him to endeavor to open the route of the Red River as an outlet for the productions of that province. He descended the river in safety, and then, foreseeing the great advantages that would accrue to his native country by possession of the right of way, proceeded to France, and laid his scheme before the government. This was at the close of the Franco-Prussian war, and all that he could obtain was leave to employ French gunboats at his own expense. Armed with this permission, he proceeded to the Red River with two gunboats and a sloop, manned by 25 Europeans and 125 Malays and Chinese. As Ly-Tuang, the representative of Tu-Duc, king of Anam, delayed to grant leave of passage, the small flotilla passed up the river to Ha-noi, from whence M. Dupuis proceeded onwards with a small party to Yunnan, leaving M. Millot in command. After the return of

M. Dupuis to Ha-noi armed with credentials from China, and accompanied by 150 Chinese soldiers, the opposition of the Anamites grew to open warfare; but the small body of strangers, aided by additional forces brought by M. Francis Garnier, carried all before it, so that in a short time the strong places of Phu-ly, Hai-Dzuong, Namh-Dinh, and Ning-Binh fell into the hands of the French. The brave Garnier perished at Ning-Binh, yet the struggle was continued, and soon after the arrival of a few troops from Saigon in Dec., 1872, almost the whole of Tong-king was conquered. At this moment M. Philastre arrived from Saigon, and gave orders for the evacuation of all the places taken. Eventually a treaty was signed in 1874, by which the French were permitted to keep consuls at Hue, Qui-nhon and Ha-noi, each with a guard of 100 men, while the Red River was declared open to commerce. The non-fulfilment of the latter stipulation led to new troubles.

In April, 1882, the citadel of Ha-noi was taken by the French, and, though soon afterwards surrendered, was early in 1883 again in their hands. The bombardment of Hue, together with the successes of General Bouet in Tong-king, forced from the king of Anam, Hiep-hoa (the successor of Tu-duc), a treaty which gave France the full protectorate of Tong-king and Anam, added the province of Bin-thuan to French Cochin China, promised the recall of the Anamite troops from Tong-king, permitted French troops to occupy the forts of the river of Hue, gave the customs of Anam entirely into the hands of France, and allowed the French government to establish fortified posts upon the Red River. In 1885 an insurrection against the French broke out, and was vigorously maintained. Finding military measures unavailing, the French tried the policy of conciliation with success. All French possessions are under one civil governor-general of Indo-China. The claims of Chinese suzerainty may be based on an ancient right, and on ancient race traditions, but are really obsolete, since Anam always acted independently of China, and its sovereign styled his empire the Great Southern Kingdom, thus placing it in the same rank with China. Fear of a powerful and aggressive neighbor so near her doors, and the wish to preserve the trade of Yunnan and Tong-king in Chinese hands, are the actual motives of the claim.

French Cochin China.—Lower or French Cochin China has an area of rather less than 23,000 square miles, and consists to a great extent of the recently formed delta of the Me-kong. The various channels of this river, connected with each other by numerous *arroyos* or canals, natural and artificial, give great facilities for communication. At various points the flat, marshy country is broken by granitic heights, formerly islands in the Gulf of the Me-kong. The real highlands commence near Saigon and extend through the provinces of Bien-hoa, Baria, and Bin-thuan; all of which are furrowed by the ramifications of the mountains that separate Anam from the basin of the Mekong.

The climate is unhealthy, especially to Europeans. In the wet season the thermometer varies from 68° to 86°, and in the dry season (Oct. to April) it rises to 95°. Even at night it only descends to about 65°, and this continued heat, coupled with the moisture, brings on dysentery, fevers, and chronic diarrhœa. In 1861 the mortality of the French troops reached 11.56 per cent., but it has now been reduced to 4.82. Cholera and small-pox commit great ravages among the natives, but their sway is checked somewhat by the protective measures of the French government, which has placed a physician in most of the principal centres, and has introduced vaccination.

The island of Pulo Condor is set apart as a penal colony, but very possibly may never be used except for native criminals, since it is known that Europeans cannot work in the climate.

At the entrance of the River of Saigon, which is the principal port and centre of the colony, is a light-house with a range of 28 miles. At this spot terminate the telegraphic cables from Singapore and China. Other maritime ports are Hatien, Rach-gia, Camau, and Cangio; Mytho, Vinh-long, Chandoc, and Sadec are river-ports, while Gorong, Tay-minh, and Thudan-mot are also centres of trade.

Upper Cochin China or Anam.—The central part of the empire of Anam is much less known than the northern and southern portions. It appears to be for the most part a mountainous, infertile, and insalubrious country, scarcely producing sufficient rice for its own inhabitants, and dependent for the greater portion of its supplies upon Lower Cochin China and Tonquin. When Nguyen-anh had finally reconquered his dominions and annexed Tong-king, he fixed his capital at Hue, in the centre of Anam properly so called, rather than at Ha-noi, the ancient capital of Tong-king, on account of the central position and inaccessibility of the former place.

Hue can scarcely be called a city; it is a citadel and a market, with perhaps from 30,000 to 40,000 inhabitants around it.

The population of Anam is certainly inferior to that of Tong-king, and its area is about 47,000 square miles. The province of Binh-dinh, in the south of Anam, is relatively rich and populous, and contains about 530 villages and 50 to 60 markets. The only road of any importance is the royal road which traverses the entire length of the country from French Cochin China to the Chinese province of Quang-si.

Tong-king.—The area of Tong-king is given by Millot at about 57,000 square miles. The portion of the population resident in the thickly populated delta of the Song-ka or Red River, and in the less mountainous part of the country, and subject to the king of Anam, is by the same authority placed at 10,000,000, while the total population, including the independent Laotian tribes of the mountains of the north and west, may be 15,000,000. Another estimate is as high as 18,000,000. The climate of Tong-king, owing to its more northern position, is comparatively salubrious. In the rainy season, which lasts from April to September, the temperature varies from about 60° to 95° F.; but the greatest heat is tempered by the monsoon. The principal rivers are the Song-ka, which rises in the plateaux of Yunnan, traverses Tong-king from west to east, and forms an extensive delta at its mouth; the Thai-bink, the Clear, and Black Rivers, the Song-Mâ, which waters the province of Thanh-Hoa, the Song-Mô, and the Song-Giauk, formerly the boundary between Tong-king and Cochin China.

The principal cities are the capital, Ha-noi, with 150,000 inhabitants, Namh-Dinh, with 50,000, and Hai-Dzuong and Thanh-Hoa, with 40,000 each. There are some 20 other towns of less importance in the delta and lower portions of the country. The chief vegetable productions are rice, which is the staple vegetable

food in the delta of the Red River and in the provinces of Thanh-Hoa, Nghe-An, and Ha-Thin; corn, yams, sweet potatoes, sugar-cane, tobacco, cotton, cinnamon, eagle-wood, indigo, and castor-oil. The gardens of all the better class have a patch of sugar-cane, and in Namh-dinh another kind of sugar-cane is grown on a larger scale. Cotton succeeds well in lowlands exposed to the sea-breeze, and since the treaty of 1874 a small quantity has been exported. The mountaineers of the Yunnan border cultivate an excellent quality of tea.

Among the peculiar productions of the country are a tree, the oil from the fruit of which preserves wood from the action of water; a plant called Hoang-Nau, of the strychnine family, reputed an effectual remedy in cases of hydrophobia, paralysis, bites of venomous serpents, etc.; and *calambac*, a wood so odoriferous that its scent can be perceived even when it is buried five feet deep. Rosewood, ironwood, ebony, sandal-wood, various essences, gums and varnishes, and timbers, suitable for ship-building, grow upon the mountains. Coffee has been grown with success by the missionaries at Keso.

The mineral riches of Tong-king are great, and include gold, silver, copper, tin, mercury, zinc, galena, iron, antimony, iron, precious stones, and coal. The cupriferous deposits of Tong-king are continuous with those of Yunnan, and are believed to eclipse even those of America in richness. All the vessels of the natives of Thanh-Hoa are of this metal. The tin mines of Lao-Kai are at present not worked for want of capital. The silk-worm succeeds well, but the natives do not know how to prepare the cocoons, nor the silks equal those of China.

The most remarkable feature in the topography of Tong-king is the delta, which is as much the work of man as the gift of the river. The moment a rising bank of silt is perceived, a dyke is constructed, the flood-waters of the river are regulated by sluices, rice-fields spring up behind the dyke, and villages rise above the rice-fields. The dykes, the largest of which are 14 feet wide at the summit, and some 20 feet high, form a network of roads, the only means of communication by land during the wet season, and the means by which the entire country can be flooded at pleasure.

The boundary between Tong-king and the Chinese province of Quan-tung is one of the most singular ever traced. A detached tract of Anamite territory, much of which is overflowed at high tide, is separated from the rest of Tong-king by a peninsula belonging to China, and the rocky promontory of Paklung, together with a number of islands, effectually conceal a channel along which passes a flourishing contraband trade, the headquarters of which, and of the Black Flags, is Mong-Kai, a thoroughly Chinese town on Anamite territory. Mong-Kai is a city of rich merchants and well-built houses, contrasting strongly with the thatched dwellings of the Anamites. The Anamite provinces of Lang-So'n and Cao-bang are in the basin of the Bay of Canton; and these provinces were garrisoned by Chinese troops until the French successes in April, 1884. The French troops, almost without a conflict, seized the citadels garrisoned by the Chinese. In May China engaged to withdraw her forces and to recognize henceforth any treaty made between France and Anam. The claim to suzerainty was reduced to a shadow, yet conceded by France.

Hog[illegible] of Cochin China.—Millot, *Le Tonkin. [illegible]* June 2, 1883. Paulus, *Le Cochin Chine [illegible]. Scien.*, Dec. 15, 1883. Auvray, A., *Dix-huit mois á Hue. Bull. de la Société de Géographie. 3me trimestre*, 1883. Hallett, H. S., *On the Advance of the Southern Chinese. Proc. Roy. Geog. Soc.*, Nov., 1883. Labarthe, Ch. *Les Limites du Tong-king et de la Chine au cap Paklung. Rev. de Géographie, Mai*, 1883. *L'administration actuelle de Tong-king sous la domination annamite. Rev. de Géog. Juin*, 1883. *Pui-nhon et la province de Binh-dinh. Rev. de Géographie, Sept.*, 1883. *Les environs d'Hanoi et la campagne annamite. Rev. de Géographie, Oct.*, 1883.

(W. N. L.)

COCHRANE, Alexander Dundas Ross Wishheart Baillie, known as Baillie Cochrane, a British author, the son of Admiral Sir Thomas John Cochrane, was born Nov., 1816, and was educated at Eton and at Trinity College, Cambridge. He was a conservative member of parliament for Bridport, 1841–46, and 1847–52; sat for Honiton, 1859–68, and in 1870–80 was representative for the Isle of Wight. He is author of a volume of *Poems* (1838); *Exeter Hall* (1841); *The Morea, a poem* (1841); *The State of Greece* (1847); *Ernest Vane* (1849); *Florence the Beautiful* (1854); *A Young Artist's Life* (1864); *Young Italy* (1865); *Francis I. and other Historic Studies* (1870); *Historic Châteaux* (1876).

COCKBURN, Sir Alexander James Edmund, Bart. (1802–1880), a British jurist, born in London in 1802. He was educated at Trinity Hall, Cambridge; came to the bar in 1829; was made queen's counsel in 1841; entered parliament for Southampton, 1847; was knighted and made solicitor-general, 1850; was attorney-general, 1851–52 and 1852–56; became chief-justice of the common pleas in 1856, and chief-justice of the queen's bench in 1859. In 1858 he succeeded to a baronetcy. In 1871 he was appointed one of the arbitrators for the settlement of the Alabama claims, but at the Geneva conference he refused to concur with the rest of the arbitrators, and afterwards published his reasons for this refusal in an elaborate statement. In 1873 he was made a knight Grand Cross of the Bath. He was a liberal in politics, an eloquent speaker, and a lawyer of high reputation; but his private life occasioned unfavorable criticism. He died at London, Nov. 21, 1880.

COD. *Natural History.*—The cod-fish of commerce is the *Gadus morrhua* of naturalists, and belongs to the family *Gadidæ*. The *Gadidæ* belong to that division of the true fishes which is known as *Physoclisti* (from φῦσα, bladder, and κλειστός, closed), on account of the absence of any connection between the swim-bladder or air-bladder, and the gullet. The entire family of *Gadidæ* may be broadly called cod-fishes, and though the species known as *Gadus morrhua* or *G. callarias* is by far the most useful and widely spread, most of the species are highly valued as food.

See Vol. VI. p. 95 Am. ed. (p. 103 Edin. ed.).

The *Gadidæ* are fishes of elongate form, and are covered with smooth (cycloid) scales, which are small and in some species wanting. The gill-openings are very wide, and the head, body, and fins are entirely devoid of spines. The absence of spinous rays in the fins is a character which separates the cod family and a few others from the majority of the physoclistous fishes, which are usually provided with several spines in the dorsal fin, beside some in the anal fin and one in each ventral fin. In the *Gadidæ* all the fin rays are formed of small joints or articulations, and are therefore flexible. The dorsal or back fin extends along almost the whole length of the back, and may form a single fin, or be divided into two or three fins; and

the opposite anal fin is long and often divided. The caudal or tail-fin is sometimes confluent with the dorsal and anal, but more usually distinct, and is of symmetrical shape. The ventral fins are situated in advance of the pectoral or breast-fins, and consist of from one to eight rays. The air-bladder is usually well developed, and there are four gills.

The family includes 35 genera and about 90 species, chiefly inhabitants of the northern seas. They frequent water with a temperature of 39° to 41°, and are mostly bottom-feeders. In the true cod-fishes of the genus *Gadus* the chin is furnished with a barbel; bands of teeth are present on the jaws and vomer, but none on the palatine bones; there are three dorsal and two anal fins, and the ventral fins have about seven rays. The common cod (*G. morrhua*) is a rather large fish, three feet or more in length. It is subject to many variations in color, often greenish or brownish, sometimes yellowish or reddish; the back and sides have numerous rounded brownish spots, the lateral line is pale, and the fins darker than the body. The proportions of the head vary from about two-sevenths to about two-ninths of the total length; the eye is of moderate size, about half the length of the snout, and the outer row of teeth in the upper jaw and the inner row in the lower jaw are slightly enlarged. The first dorsal is rather low, about equal in height to the length of the pectorals, the caudal is slightly emarginate, and the vent is situated under the front of the second dorsal. The greatest depth is about one-fourth of the length; the dorsal fins have 14, 21, and 19 rays respectively, and the anal 20 and 18. The cod is found in all the northern seas, extending southward to Virginia on the Atlantic and to Oregon on the Pacific coast. On the Asiatic coast of the Pacific it reaches to Japan. The fish of the Pacific Ocean has been described as a distinct species, but presents no external differences, though it is said that the sounds or swim-bladders are smaller. The cod-fish of Greenland (*var ogac*) is very dark, and has a more slender caudal peduncle, longer barbel, larger eyes placed more widely apart, longer pectorals, and more advanced ventrals than the normal form. *Gadus gracilis*, found in Bering's Sea and in the Pacific from Alaska to Japan, has the second ray of the ventrals longer than it is in the other species, and the vertebræ are constructed as in the Hake (*Merlucius*). The Tom-cod (*G. Tom-cod*) of the Atlantic coast is a small species with long filamentous ventrals and long pectorals, and is found from Virginia to Labrador, and the Tom-cod of the Pacific (*G. proximus*) is a very similar species found from Monterey to Alaska. The latter of these is slightly the larger, but does not exceed a foot in length. It may be recognized by its more elongate snout, and the more anterior position of the vent. The Pollack, Coal-fish, or Green Cod, has short pectorals and ventrals, is of a greenish brown color, and is common in the north of both coasts of the Atlantic. The Haddock (*G. æglefinus*) is an important food-fish of both coasts of the North Atlantic, reaching a considerable size. It may be known by the black lateral line, the large dark blotch above the pectorals, and the elevated anterior rays of the first dorsal. *G. chalcogrammus* is another North Pacific species, occurring south to Monterey, and may be known from the common cod by its large eye, high first dorsal, filamentous ventrals, and the minute black spots in body and fins.

In the Hakes (*Merlucius*) there is no barbel on the chin; the teeth of the jaws are in two series, those of the inner longer and movable; there are two dorsals, and the vertebræ have their neural spines wedged into one another. The species are very similar. They are large voracious fishes, common in Europe and on both coasts of North America, but not highly valued as food. The Pacific form extends southward as far as Santa Barbara, the Atlantic form to New England. The Cusk (*Brosmius brosme*) has a single long low dorsal and single anal, with a rounded caudal. Teeth are present on the palatines as well as on the jaws and vomer. It is a fish of the Arctic regions, but occurs southward to Cape Cod and Denmark. To the genus *Phycis* belong several species with a barbel, long filamentous ventrals placed wide apart, and consisting of only two or three rays; two dorsals, the second long, and a single anal. Five species—*P. regius*, *P. earlii*, *P. chuss*, *P. tenuis*, and *P. chesteri*—are enumerated from the Atlantic coast of North America. The first is said to exhibit electric powers during life. The species are commonly known as Codlings, White Hakes or Squirrel Hakes. The Rocklings (*Onus*) are small gadoid fishes of the North Atlantic, more slender in form than the cod or hake, with a chin-barbel and two or four barbels on the snout, two dorsals and an anal. The first dorsal is composed of small fringe-like rays concealed in a groove, with a single long ray in front. The Four-bearded Rockling (*O. cimbrius*) is the best known.

Dinematichthys marginatus, the Cusk of the Pacific coast, has very rudimentary scales sunken in the skin, a single long low dorsal and anal, and two-rayed filamentous ventrals. It is of a reddish brown color, and occurs in deep water. Other American deep-water *Gadidæ* are *Bythites fuscus* from Greenland; *Halpyphyrus viola*, a deep purple fish with a U-shaped mouth hidden below the snout, found on the Banks of Newfoundland and southward; *Physiculus dalwijkii*, which has been taken in Massachusetts as well as in Madeira; and *Hypsicometes gobioides*, found in the Gulf Stream, off the coast of Rhode Island, and characterized by its much projecting lower jaw.

The Ling (*Molva vulgaris*) is found in Greenland as well as in Northern Europe. The lower jaw has large canines which are arrow-shaped and movable. The only fresh-water gadoid found in the United States is the Burbot (*Lota maculosa*), which lives in the streams and lakes of New England and the British Possessions, and occurs also throughout Northern Europe and Asia. It is a slender fish, about two feet long, and has a long barbel on the chin, and one in front of each nostril. The scales are very small and embedded, and the first dorsal is very short. Two genera of Gadidæ, *Stygicola* and *Lucifuga*, are blind, and inhabit the cave streams of Cuba.

A species of *Bythites* has recently been taken by the *Talisman* at a depth of about 2300 fathoms. It appears probable the cod itself inhabits much greater depths than those at which the fisheries are usually carried on.

As many as 10 genera and 19 species of the family occur in the Mediterranean.

Habits.—Cod-fish are gregario[illegible] found together both on the sp[illegible] ground and when migrating. T[illegible] dense when migrating, but becom[illegible] bunches on the feeding-grou[illegible] fish differ much in size, a[illegible] maturity, and it seems prob[illegible]

remain separate, spending the first three or four years of their life among rocks and algæ. Cod-fish sometimes take long journeys. Some fish captured at Cape Ann in the winter of 1877–78 had in their mouth hooks identical with those used by the French trawlers at the Grand Banks five to eight hundred miles away.

The ı ıdance and migrations of their food, and wıng instinct, seem to be the chief causes determine the movements of cod. Their food, feeding season, embraces nearly everything and they will snap at and even swallow bright objects. In the spawning season they cease ıı for food, yet will usually take bait. Notding its voracity it is on the whole a dainty must be fished for with the flesh it prefers. the feeding-season one school seems to live ...e kind of food, and another on another kind; ishermen speak of the clam-school, the herring-ol, and the squid-school, and will pay high prices he bait on which the fish are feeding. Mr. Earll s his belief that this is not of so much importance spawning fish as it is in the feeding-season. s (*Mya*), sperling or young herring, fresh and n herring, fresh and salt squid, fresh and salt ...aden, capelin (*Mallotus villosus*), and alewives principal bait used in New England. On the coast the flesh of the salmon is used.

"school-fish" which live in deep water are very ...v, with small distinct spots on a light back-; while the shore-fish, which are more or less ...y, less active, and less well fed, seem to have a head in proportion to the body, are in poorer ion, and have larger and less distinct spots on a ground.

the coast of North America the "pasture ..." of spawning fish makes its appearance about ... 1. The fish probably average from 12 to ... Exceptional specimens attain a great size. ...en in 1883 near Portland measured 5 feet ... n length, and weighed 100 pounds, and there ... ientic record of a fish caught off Cape Cod in ...ry, 1878, that weighed 107 pounds after evis-..., which is equivalent to 125 pounds "round." principal enemies of the cod are dog-fish. ...season of spawning appears to be somewhat pro-..., for the first ripe female seen during the season ...78–79 was taken Sept. 2, and even in the June ...ring some had not finished oviposition. This is ...inted for by the vast number of eggs, of which ... a small portion are ripe when the female com-...ces to lay. A 21-pound fish has 2,700,000 eggs, a ...-pound one 9,100,000. The largest number of eggs found in a series of seven haddock was 1,840,000, the smallest 169,000. The pollack may have more than 4,000,000 eggs.

Artificial Propagation.—The artificial culture of cod was commenced in this country in 1878. As the ... at, at a varying depth, near the surface, the ...apparatus which was found most satisfactory ... of a row of buckets connected by a pole, and ... motion, backwards and forwards, by a steam-... They are thus swung through about 90°, and ...angement of valves and slits permits a free cir-...n of water among the ova. During the first ... apparatus was used more than 70 per cent. ... developed to young cod-fish, and half a ... placed in the sea at Gloucester, Mass. ...ns in all were placed in the water there, ...bers at Wood's Holl. The latest statement published by the Fish Commission, dated 1887, gives 22,000,000 for the hatch of that year. Of these 500,000 were placed in the Gulf of Mexico, and 100,000 in Chesapeake Bay. The appearance of young fish in considerable numbers indicates that artificial propagation of cod-fish is a success, and that the coast-waters from Cape Cod to the Bay of Fundy may thus again swarm with cod, as they did before the fishermen nearly exhausted this portion of the coast.

As in a state of nature but few of the numerous ova are fertilized, and by far the greater number of those which hatch perish before they are at all able to take care of themselves, it is evident that artificial fertilization and care of the young in their early stages must have great influence upon the actual increase of the species.

Extent of Fishery.—The cod-fishery is the most important of the fisheries of the Atlantic coast of North America, and is carried on at various points between Greenland and Cape Cod. It is difficult to estimate the exact amount taken in any year, since not only the Americans and British, but also the French, engage largely in the pursuit, and there is an extensive local consumption of fresh cod.

The first mention of cod-fish on the New England coast is by Bartholomew Gosnold, of the ship Concord, in 1602. Soon after this the fishery commenced, and in 1622 the ships brought out colonists who were to engage in agriculture except during the fishing season. It was not until the beginning of last century that the fisheries became extensive. In 1741 Gloucester owned 70 sail. At the beginning of the present century the bank fleet had decreased to eight sail of more than 30 tons, but the inshore grounds were fished by fully 200 boats. In 1819 the fisheries were so depressed that Congress passed "the bounty act" for their encouragement. By 1847 the fleet had increased to 287 sail, with an aggregate of 12,354 tons. The Cape Ann fishermen first visited the famous George's Bank about 1830, and by 1850 this was a favorite resort for both the cod and halibut fleets. In the spring of 1879 there were 39 fishing-firms at Gloucester and 378 vessels of over 5 tons burden, and the total number of fishing-vessels belonging to Cape Ann was about 415 sail.

Other banks frequented are Brown's Banks, La Have, Quereau, Western and the Grand Banks of Newfoundland.

In 1867 the tonnage of vessels engaged in the cod-fishery of the United States was 44,567 tons, and that of vessels in the mackerel fishery 31,498 tons. For many years the cod and mackerel licenses have not been issued separately, the highest tonnage in these two fisheries being in 1873, when it reached 109,519 tons. In 1880 it had fallen to 77,538, and in 1886 it was only 49,226, of which 26,500 tons belonged to the cod fishery. This included 365 vessels, with crews aggregating 4800. These vessels were valued at $1,405,000, and the catch of fish at $1,840,000. In 1890 there were imported into the United States of dried, smoked, and pickled cod (including haddock, hake, and pollock) 12,750,312 lbs., valued at $409,388; and exported 17,030,019 lbs., valued at $793,186.

The census of 1880 showed the quantity of cod-fish landed in Gloucester to be 36,665,620 lbs. of cured fish, which, at the low average of three cents per pound, would have a total value of about $1,100,000. This quantity of cured fish represents not far from 91,650,000 lbs. of round fish. The weight of fresh and salted cod-fish brought into the

same port in the year ending May 31, 1883, was about 44,800,000 lbs., and in the same year nearly 9,000,000 lbs. of hake, pollack, haddock, cusk, and other gadoid fishes were landed at the same port; besides about 2,500,000 lbs. of cod and allied fishes imported from Maine, and more than 3,000,000 from the British provinces.

The exports of dried cod-fish from Newfoundland and Labrador, in the year ending July 31, 1882, were 1,463,439 quintals, of the value of as many pounds sterling. To this must be added 1457 quintals of green cod-fish, 4254 tuns of cod-liver oil, worth about $597,100, 83 tuns of cod blubber, 10 barrels of cod roes, and 62 packages of cod sounds and tongues. These exports are entirely from the catch of 1881. The more recent statistics of the cod fishery do not differ very materially from those above given.

The cod-fishery of the Pacific coast is insignificant beside that of the Atlantic, but this does not arise from any scarcity of the fish, which is stated to abound among the numerous islands of the north-west coast, but from the want of a sufficiently extensive market. The expense of transcontinental freight, and the smallness of the population between the Sierra Nevada and the Rocky Mountains, practically limits the market to the Pacific States, though small quantities have been sent to South America and Australia. The fishery was commenced about twenty years ago, and at that time the salted fish sold at nine cents per pound. At the present time the best case cod is quoted at from three and a half to four cents per pound. The total catch brought to San Francisco in 1878 was about 1500 tons; in 1879, 1800 tons. During the year 1882, 11,697 packages of cod were exported from San Francisco; of these 8057 went to Australia, and 1486 to the Sandwich Islands.

The principal cod-fishing-grounds on the American Pacific coast are at the Shumagin Islands, to which vessels of 120 tons are sent. Larger vessels, up to 350 tons, are sent to the Sea of Okhotsk, which furnishes rather the larger half of the fish. The vessels which run to the Shumagin Islands occasionally take two trips, but those which go to the Okhotsk Sea make but one, leaving in March or April, and returning from June to October. The full cargo of a vessel of 120 tons is 75,000 fish.

The winter fishery for the capture of the haddock is carried on chiefly from the ports of Gloucester and Portland, though to some extent participated in by vessels from Portsmouth, Swampscott, and Boston. It is of comparatively recent origin, dating back about thirty years. The principal haddock fisheries are located north of Cape Cod, but the fish is taken on all the in-shore ledges and on the nearest of the off-shore banks, from south of Sable Island Bank to Sandy Hook. The depth at which it is taken varies from 25 to 90 fathoms, but is usually more than 30 fathoms. The vessels of the winter haddock fleet are usually the stanchest and swiftest of those which, in summer, are engaged in the mackerel and cod fisheries. The fish are taken with trawls, which are coiled in tubs, each tub containing about 500 hooks, set 3½ feet apart. The best bait is salted slivers of menhaden, but fresh herring is also used. The haddock vessels never anchor while fishing: the dories are dropped and picked up, then dropped again to haul in their lines, and again picked up with their fish, the vessel all the time keeping under sail. The process of dressing differs entirely from that of dressing cod, as there are no dressing-tables or dressing-tubs, but one set of men rip open the fish, while the rest take out the livers and roes, which they save, and remove the viscera. Most of the haddock is taken into Boston. Pollack are also taken in large quantities, more than 2,000,000 pounds being carried into Gloucester in a single year.

Cod-fish are abundant around the coasts of Great Britain and Ireland, and the waters of those countries are supplied with a large number of other gadoids. The Dogger Bank, and Rockall, off the Outer Hebrides, are celebrated localities for this fish. On the Norwegian coast are the Loffoden fisheries near the Westfiord, and the Romsdals fisheries between Stat and the Trondhjems Fjord.

The cod come to spawn on the coast-banks, the water of which has been warmed by the Gulf Stream. Along the coasts of Finmarken the cod approach the coast to devour the capelin (a species of trout), and are taken from March to May, during which period about 66,000 persons gather to fish, or buy and prepare the catch. The cod-fishery in Norway seems to have existed from time immemorial, but is subject to great fluctuations. In 1873 the total catch was about 49,500,000 fish, having a value on the fishing-grounds of $4,240,000. In 1877 the yield was the most abundant of which we have record, amounting to 70,000,000 fish, worth on the spot $6,300,000. In the year ending March 5, 1881, the total catch of the Norwegian fisheries was only 13,000,000 cod, and in the two succeeding years this amount was further reduced to 5,500,000 and 6,000,000. In 1877, 4567 boats, manned by 21,287 men, were engaged at the Loffoden Islands fishery.

Methods of Fishery.—On the coast of Alaska the cod-fishery is usually carried on at depths of from 10 to 15 fathoms, but in the Sea of Okhotsk, where angle-lines are used exclusively, depths of 40 to 50 fathoms are fished. When the depth is not too great, and there are no rocks, trawl-lines are used in Alaska. These are lines often 600 fathoms long, to which a number of hooks are secured by shorter lines at about a yard apart. Several are paid out, the end of each being indicated by a buoy. An angle-line bears two hooks, kept apart by a piece of wire, and has a heavy weight attached. The fisherman stands erect in the boat, and manages two lines, one on each side. A skilful fisherman will catch from 500 to 1000 a day when fish are plentiful, and is paid about [illegible] per [illegible]. The fish are headed, split, eviscerated [illegible] "pickle" or salt until they arrive in [illegible] Francisco, when they are dried in [illegible] erected for the purpose. Some of the [illegible] dried in bulk and then piled, as is done [illegible] tic, but are kept in pickle in tanks of redwood and dried when required. It is claimed that [illegible] sults are thus obtained, contrary [illegible] pickle-curing in New England. [illegible] packed in boxes, are known as "[illegible] size are made into bundles, [illegible] divested of skin, fins, and [illegible] packed in cases, and sold [illegible] Much of this work is done by boys [illegible] also largely prepared on the A[illegible]

The angle-line and trawl or [illegible] varying greatly in length and in [illegible] of the hooks, are the most [illegible] for the capture of cod. [illegible] water and on an even b[illegible]m the result. The trawl

buoys and anchors attached to each end of the line, and are taken up at daybreak. Another engine of destruction, now much used, is the gill-net. Gill-nets were not introduced in Norway before 1685, and it was long before they came into general use, though indispensable when the cod does not bite. A boat when complete carries six men and a boy. Each man has 10 nets, and each net is from 18 to 20 fathoms long, and 10 to 13 feet deep, with meshes 2.8 to 3.2 inches square. They are kept upright with glass balls covered with knotted tarred cord, and are joined in lines of from sixteen to twenty, forming fences 300 to 400 fathoms long. The nets are dropped in the evening, and taken up in the morning.

Cod gill-nets have recently been introduced at Gloucester, Mass., with some advantage in certain conditions. The nets cannot be safely set upon a rocky bottom, but when set upon a clear bottom seem to catch fish that are, on the average, larger than those taken by the trawlers. As there is no bait bill to pay, the profits are larger upon the same quantity. In rough weather the nets are not successful. Seines or bottom nets have been in late years introduced with success in the Loffoden Islands.

The common fishing dory, in use in America, is a flat-bottomed "lap-streak" boat, with sharp projecting bow, V-shaped projecting stern, and flaring sides. It is 13 to 15 feet long on the water-line.

In the Atlantic fishery the fish are weighed as soon as they are caught, and are pitched into a tub; they then pass through the hands of three men—the "header," who severs the head at the gills, and slits the abdomen to the vent; the "gutter," who seizes the fish as it falls into the tub and removes the viscera, putting the livers into a barrel on one side, and the roes into a barrel on the other; and the "splitter," who takes up the fish as they are thrown on a table by the gutter, and dexterously cuts out the back-bone and opens the fish, sliding it into a tub of water, where it is washed.

"Pickle-curing" is done on shore. The fish are placed in butts with salt and brine for two weeks. After this they are dried for a day or two and sent to market. This mode gives inferior results to "kench-curing." In "kenching" the fish are salted in piles, either in the hold of a ship, or on the floor of a fish-house. Each fish is placed back downward, so that the salt as it dissolves will pass through the body. To prepare for market, they are thoroughly washed and scrubbed and placed on the flakes until dry.

Usually 250 to 400 cod-fish give one barrel of liver, but 700 to 1100 are sometimes needed. Two to two and a half barrels of liver yield a barrel of oil in some seasons, but in others four or five barrels are required.

The oil that comes away easily is pale, and is that which is chiefly used in medicine. The purest and best is procured while the livers are fresh. The livers are then put to cook and the pale brown oil first extracted, and then the inferior brown oil, which is principally used by tanners.

The value of the roe has recently declined, so that most of the off-shore fishermen do not save them. The sounds are dried for the manufacture of gelatine, and also for food. In the latter case they are mixed with the to

(W. N. L.)

CODE.—[illegible] ion of the laws governing the [illegible] ing world received its first [illegible] odiment in the New York [illegible] of Civil Procedure enacted in [illegible] provision was inserted in the re-Constitution of that State, adopted in 1846, providing for the codification of both the substantive and remedial law; and legislation to effect the constitutional provision was carried out in 1847, whereby two commissions, called respectively the "Practice" and the "Code" Commission, were constituted. It was known that David Dudley Field was the originator and the chief promoter of the constitutional and legislative movement toward codification, and he became one of the commissioners, having for his associates Arphaxad Loomis, David Graham, William Curtis Noyes, and Alexander Bradford.

The codes of procedure, civil and criminal, were fully completed and reported by 1850, a portion of the Code of Civil Procedure having been adopted, as before stated, in 1848. The Code of Criminal Procedure, although before the legislature and the executive on various occasions, was not finally enacted until 1881. The reforms effectuated by these codes are the abolition of the distinction between legal and equitable practice, and the simplification of procedure in general.

With reference to the codification of the substantive law, there was so much difficulty that it was not until 1865 and 1866 that completed civil and penal codes were reported to the legislature. The civil code, embracing the law of personal and property rights, has been passed by the legislature twice, but met the executive veto. A commission to codify the laws relating to corporations has been recently formed. The penal code, embracing the law of crimes and punishments, after repeated failures, went into effect Dec. 1, 1882. The Sunday provisions of the new penal code created much dissatisfaction on account of their strict enforcement in New York city, although similar enactments had been on the statute books for half a century, but not enforced. A more liberal interpretation of the chapter relating to Sunday observance has since prevailed, and no important change in the social conditions of Sunday is observable as attributable to the penal code.

The influence of the New York Codes in law reform and codification throughout the English-speaking world has been so marked as to demand especial notice. Their origination marked the inauguration of a reform in jurisprudence which has extended to England, India, Australia, and more than half of the United States of America. By the Judicature Act of 1873 the jurisdiction of courts in law and equity was united upon the principles of the New York Code of Procedure of 1848. The provisions of this code have been substantially adopted in the following States and Territories: Missouri, Ohio, Kentucky, Indiana, Wisconsin, Iowa, Minnesota, Kansas, Nebraska, Nevada, California, Oregon, Mississippi, North Carolina, South Carolina, Arkansas, Connecticut, Washington, Arizona, Utah, Idaho, Montana, Wyoming, and Dakota. The code of criminal procedure has been adopted substantially by Indiana, Wisconsin, Iowa, Minnesota, Kansas, Nebraska, Nevada, California, Oregon, Kentucky, Arkansas, Washington, Arizona, Utah, Idaho, Montana, Wyoming, and Dakota. The code of civil rights and the penal code, with slight modifications, have been adopted in California. The tendency of modern jurisprudence in England and America seems to be strongly in favor of the complete codification of the law, such as prevails in Continental Europe.

(A. P. S.)

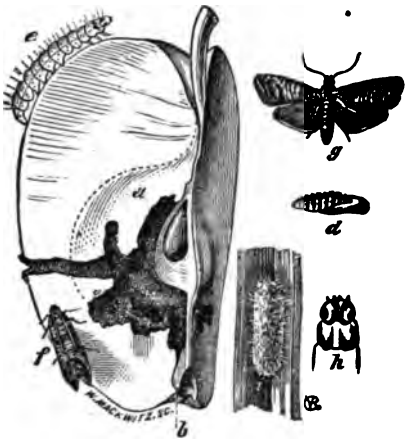
CODICIL, in law, a supplement or addition to a will, either changing the dispositions of the will, partly revoking the same, or making new provisions regarding the testator's estate.

In order to be valid and effectual a codicil must be executed with the same formalities required in the case of a will. When so executed a codicil will be deemed part of a will, and will be construed with it as one instrument. When a duly-executed codicil is attached or refers to a paper defectively executed as a will, the effect will be to give operation to the whole as one instrument. The effect of a codicil to a will is also to republish the will as of the same date of the codicil.

There may be numerous codicils to the same will. The effect of each of them upon prior codicils either attached or referred to is the same as upon the will itself. Such prior codicils will be validated if defectively executed, and will be considered as republished.

It is not competent for a will executed in due form to provide for the payment of such legacies as may thereafter be bequeathed by codicils informally executed, since all such papers are testamentary, and must be so treated, thus referring their operation to the effect of the probate. See WILL. (L. L., JR.)

CODLIN MOTH (*Carpocapsa pomonella, L.*). —The codlin moth is the most important of the fruit enemies of this country. It is not indigenous, but was imported from Europe, and during the last fifty years has been gradually spreading west, until of late years it has been doing most damage in California. The moth belongs to the Tortricidæ or leaf-rollers, and lays its eggs in the spring, near the blossom end of the fruit, as soon as this has well set. The



Carpocapsa pomonella; a, section of infested apple; *b*, point of entrance; *c*, larva; *d*, chrysalis; *f*, *g*, moth at rest and with wings expanded; *i*, cocoon, natural size; *h*, head and first joint of larva, enlarged.

larva, hatching, works its way directly to the core, and lives near the heart of the fruit, making the large cavity, partially filled with excremental pellets, so familiar to fruit-eaters. The larva state lasts from four to five weeks, and the worm bores directly out, cutting through the skin, and, if the fruit has fallen to the ground, crawling to the trunk of the tree and spinning a slight silken cocoon under the shelter of bark scales, or in other convenient crevices. If, however, as is frequently the case, the apple has not fallen, the larva crawls part-way down the trunk, and pupates in a similar manner. In mid-summer, the pupa state lasts only two weeks, more or less, and the moths, after pairing, lay the eggs for a second generation of worms which issue from the fruit and spin up all through the fall, remaining in the cocoons as larva, however, throughout the winter, and only transforming to pupæ in the spring. It seems to be pretty well settled by recent investigations that the worms often migrate from one apple to another, especially with the early brood, and that the wind-falls are in the majority of instances deserted before the fruit falls. This diminishes the value of the old remedy of turning swine into the orchard to devour the fallen apples. The codlin moth is not confined to the apple, but breeds freely in the pear, the quince, and the crab-apple, and it has even been bred from peaches and plums, and also from the pulp of a screw bean (*Strombocarpa monoica*).

Remedies.—Wherever the subject of [illegible] been extensively discussed, concert of [illegible] thorough use of woollen or pa[illegible] bau[illegible] recommended. These bands are [illegible] trunk, two to a tree, one near [illegible] crotch, the object being to afford [illegible] the worms to spin up, where they [illegible] and destroyed. One tack to a [illegible] ends is sufficient, and [illegible] soaked in hot water, or [illegible] wringer. The cost of thus pu[illegible] been placed at 2 cents a tree fo[illegible] 4 cents for the woollen ones, and [illegible] satisfactory.

The bands should be placed on the [illegible] dle of May and examined weekly thro[illegible] mer. Syringing the [illegible] about the [illegible] moths are laying their [illegible] or w[illegible] ting, with a very weak [illegible] London purple, has been fou[illegible] effe[illegible] tive, and may be practised a[illegible] worms with little risk of the [illegible] fruit. The less dangerous [illegible] preferable under ordinary circu[illegible] bark should be scraped off old [illegible] the larvæ that have spun up [illegible] other shelter in rooms where app[illegible] should be destroyed in early spr[illegible] hot water.

Several birds, [illegible] the crees[illegible] and the downy woodpe[illegible] devour their contents, while [illegible] and a few parasites at[illegible] *Chaliognathus Pennsylvanicus* [illegible] among the former, and *Pimpla conquisitor* and *Ephialtes extrematis* among the latter, [illegible] 4th and 5th Entomological Report o[illegible] Missouri.

Fires and lights and bottles of s[illegible] up in the trees are repeatedly rec[illegible] act people, who mistake other [illegible] Experiment shows that the cod[illegible] ciably attracted by these means, [illegible] trary many of its natural enemies [illegible] and destroyed.

The pasturing of sheep in an infested [illegible] be recommended. (L. W. [illegible])

COERCION (Lat. *coercere*, fr[illegible] press together; to restrain). It [illegible] nally referred only to force [illegible] son from doing anything, but [illegible] also includes compulsion to *do* an[illegible] synonymous with *duress*.

Coercion may be positive [illegible] direct coercion takes place w[illegible]

pelled to do or to refrain from doing some
g; as, for instance, if he falls into the hands
ntry's enemies and is compelled, by a just fear
to serve against it. Presumed coercion takes
a any person, legally under subjection to an-
nduced, in consequence of such subjection, to
contrary to his will; as when a married wo-
mpany with her husband commits an offence
t *in se*. In such case the law *presumes* that
nder her husband's coercion, and not of her
rill.

will, or rather the free exercise of will, is
to the commission of a crime or the comple-
ontract, a person coerced into either has no
e subject, and is therefore not held as re-

BIDÆ, the honey-creepers, a family of
serine birds of the warmer parts of Amer-
ally the West Indies. They are small birds,
ır or five inches long, of varied bright colors,
ted wings, short tail, and very acute bill
long as the head, usually decurved; the
ed for honey-sucking, cleft, or brushy at the
primaries nine. The family is scarcely dis-
from the *Dacnidæ*, and is also related to
ican *Sylviadidæ*. There are about 40 species.
r of the genera *Cœreba*, *Diglossa*, and *Cer-*
e of the last (*C. bahamensis*) occurs in Flor-
is 4½ inches long, dark brown above, white
h a white line over the eye, and white
the wings and tail; the breast and rump
of the wings bright yellow; the bill and
the eyes blue. (E. C.)

E TREE, KENTUCKY COFFEE, is in botany
dus Canadensis—Gymnocladus being derived
Greek words signifying naked branches, the
peculiar in making coarse leading shoots, but
de-branches. The leading bud does not ma-
the next spring two buds below push into
d thus in a geometrical ratio the subsequent
de. It is singular that very little more has
d to our knowledge of the tree than was given
x in his *North American Sylva*, issued in
art of the century. So recent a work as Dr.
cher's *Resources of the Southern Fields and*
sses it wholly without notice. It is a legu-
nt, not far removed from the honey locust,
Canada, where, from its stumpy appearance,
French settlers called it *chicot*, extending
ugh the whole district bounded by the Ohio
s Rivers. It is most at home in Kentucky,
ed attempts to use it when coffee could not
d to its common name. Michaux says the
used in housebuilding and cabinetmaking.
to be hard and solid, and to have good qual-
ttention has not been directed to it. It grows
lly, and some have recommended it for plant-
ly places near the sea-coast. The bark is very
it does not appear to have been made of use
As an ornamental tree it is in some degree
ity with cultivators. When planted so as
nterfered with by other trees, it will make a
n 10 feet in circumference, and 40 feet high
nching, then making a dense round head of
eauty in park scenery. In its native woods
eaches more than half these proportions. It
able as having no close relatives and as being
o so small a district of country in the United
(T. M.)

COFFIN, SIR ISAAC, Bart. (1759–1839), a British admiral, was born in Boston, Mass., May 16, 1759, the son of the collector of the port, a loyalist gentleman of a Nantucket family. In 1773 young Coffin entered the British navy as a midshipman, serving under his patron, Admiral Montague, and under Admiral Arbuthnot. In 1778 he was made a lieutenant, and in 1781 he took part in an action off Cape Henry against the French fleet. He was, in that year, promoted to be a commander, and in 1782, under Admiral Hood, he was engaged in the battle between Rodney and De Grasse. In 1788 he was deprived of his commission, and went to Brabant, where he took service on the popular side, but was soon restored to his former rank in the British navy, his sentence being reversed. In 1790 he was made post-captain. Disabled by an injury received in trying to rescue a drowning man, he was put in charge of a naval depot at Leith, and afterwards performed similar duties in Corsica, at Lisbon and at Port Mahon. In 1804 he was made a rear-admiral of the blue, and a baronet; in 1808 a vice-admiral, in 1814 admiral of the blue, and in 1830 admiral of the white. He sat in parliament for Ilchester, 1818–26. In 1826 he visited Nantucket and founded the "Coffin school," which he afterwards endowed. The Magdalen Islands, in the Gulf of St. Lawrence, were granted to him, and are now the property of his heirs. He died at Cheltenham, England, July 23, 1839.

COGALNICEANU, MICHAEL, a Roumanian statesman and historian, was born in 1806. At an early age he was appointed to a newly founded professorship of national history at Jassy. In 1834 he travelled through Germany and France, gathering material for his *Histoire de la Valachie et de la Moldavie*, which appeared in 1837. On his return to Moldavia he founded the review *La Dacie littéraire*, and assisted in establishing a national drama. He also published a collection of historical documents under the title *Archiva romanesca* (1841), and gathered from the monasteries of the country ancient Roumanian chronicles, which he edited under the title *Letopisitz* (1845; 2d ed. Bucharest, 1872). He was also the founder of several journals, the most important of which, *Le Progrès*, forced the government to the emancipation of the gypsy serfs. In Sept., 1857, he was a member of the divan *ad hoc*, ordered by the treaty of Paris. He was an active promoter of the union of Moldavia and Wallachia, and when this was accomplished, in 1859, by the election of his friend, Alexander Couza, as prince of both states, Cogalniceanu took part in all the important acts of the new administration. He reduced the laws, both civil and criminal, to uniformity, introduced a system of education, and founded the University of Jassy. In 1864 he was made president of the cabinet, but the discontent produced by the radical changes he had introduced into the usages of the country compelled him to retire a year later. Under Prince Charles he was again a member of the cabinet, as minister of internal affairs, from Nov., 1868, to Jan., 1870. In 1876, when the liberal party again returned to power, Cogalniceanu was made minister of foreign affairs, which post he held during the Russo-Turkish war. He was afterwards for a short time ambassador to France, and he attended the sessions of the Congress of Berlin, but was unable to prevent the cession of Bessarabia to Russia. He was elected senator by the liberal party in May, 1879. In the discussions of the Danube question he has resisted the policy of Austria. Besides his

literary and political labors, in behalf of his country, he has endeavored to promote domestic manufactures in Moldavia.

COGNOVIT, in law, a written confession of an action at law signed by the defendant or his attorney, and given to the plaintiff, after receiving his declaration and before plea, acknowledging in substance the demand to be just, and authorizing the plaintiff to enter judgment for a sum named, either absolutely or upon specified conditions. In full, *cognovit actionem*. A cognovit differs from a warrant of attorney to confess judgment in that the latter is invariably under seal and is given before suit brought.

COHN, FERDINAND JULIUS, a German botanist, was born at Breslau, Jan. 24, 1828. He was educated at Breslau and Berlin, and in 1850 he became a *Privatdocent* of botany in the Breslau University. In 1859 he was made extraordinary and in 1872 full professor. In 1866 he founded the institute of vegetable physiology of the university. He has made special studies in regard to microscopic vegetation. Among his books and noteworthy scientific papers are *Zur Naturgeschichte des Protococcus pluvialis* (1851); *Untersuchungen über die Entwickelungsgeschichte der mikroskopischen Algen und Pilze* (1854); *Neue Untersuchungen über Bakterien* (1872–75); and *Die Pflanze* (1882), an elaborate popular work on botany. Since 1875 he has edited *Beiträge zur Biologie der Pflanzen*. His work on *Bacteria*, translated by Dolley, has appeared in English (1881).

COHNHEIM, JULIUS FRIEDRICH, a German pathologist, born July 20, 1839, at Demmin, Pomerania. He studied in the Prenzlau gymnasium, and in the Universities of Berlin, Würzburg, Greifswald, and Prague. He followed the medical profession in Berlin for a short time; became, in 1864, assistant to Virchow in his pathological institute connected with the Berlin Charity Hospital. In 1868 he was appointed ordinary professor of pathology and pathological anatomy in the University of Kiel. In 1872 he took a corresponding professorship at Breslau, and in 1878 at Leipsic, becoming also director of the Leipsic Institute of Pathology. He has made many original researches regarding the boundary lines between normal and pathological anatomy and histology, and in the field of experimental pathology. He discovered the origin of pus-corpuscles from the white cells of the blood, transmitted through the capillaries, and made great discoveries in the pathology of inflammatory processes. Among his writings are *Untersuchungen über die embolischen Prozesse* (1872); *Neue Untersuchungen über die Entzündung* (1873); *Die Tuberkulose vom Standpunkte der Infectionslehre* (1881); *Vorlesungen über allgemeine Pathologie* (1882). He died Sept. 9, 1884.

COHOES, a city of Albany co., N. Y., on the W. bank of the Hudson River, and on the S. bank of its affluent, the Mohawk, 9 m. N. of Albany and 3 m. N. W. of Troy. The town of West Troy lies just S. E. of Cohoes; and that of Green Island is joined to Cohoes by bridges across an arm of the Mohawk. Cohoes has extensive water-power; the Mohawk has a fall of 70 feet just above the city. A horse railway connects it with the adjacent towns; and it is on a branch of the N. Y. Central Railroad, and on the Rensselaer and Saratoga Railroad. The Erie and the Champlain canals both accommodate shipments. There is a series of local water-power canals. Cohoes has extensive cotton-mills, many factories for hosiery and knit goods, large iron-works, and manufactures of knitting needles, pins, paper, axes, machinery, and a great variety of other goods; it has several handsome churches, also high and graded schools, three daily and two weekly newspapers (one in French), convents, Catholic academies, and parish schools. A large element of the population is French Canadian. Population in 1870, 15,357; in 1880, 19,416.

COHOSH, BLUE COHOSH, WHITE COHOSH. Cohosh is an Indian name which, according to Rafinesque, was originally attached to *Caulophyllum thalictroides*, *Leontice thalictroides* of Linnæus. It belongs to the natural order *Berberidaceæ*, and derives its name *Caulophyllum* from the appearance of the inflorescence, which seems to arise out of a leaf-stalk of what might appear to be a leaf of *Thalictrum* or "meadow-rue." In modern times it is known as "blue cohosh," from its blue berries. The rhizome was a popular Indian remedy for snake-bites, and was used in many disorders. Cohosh is now applied to *Cimicifuga racemosa*, formerly *Actæa racemosa*, also known as bla root, which has also a good reputation in pi White cohosh is *Actæa alba*. (For full accou their medicinal uses see Griffith's *Medical Botan* Dr. Peyre Porcher's *Resources of the Southern and Forests.*) (T.

COKE.—The immense areas of bitun beds in the United Sta development of manufac the production of coke an extensive industry. Its fuel for metallurgical pur prominent factor in encouraging its enorm such large scale. The Census report for the Iron and Steel industries shows that in ceding year, 2,277,545 tons of coke were in the blast-furnaces, steel-works, rollin other manufactories. If the consumption etc., were added, the aggregate would prob 3,000,000 tons, or 150,000,000 bushels, of ally employed in the production and manu iron, and this quantity is constantly being

See Vol. VI. p. 107 Am. ed. (p. 118 Edin. ed.).

As a fuel for the blast-furnace, coke to charcoal, its open cellular structure more rapid oxidation than denser fuels. I anthracite coal or non-coking bitumino abundant, coke is mixed with the charge resistance in the furnace and encourage a g tensity of combustion. The four conditions as essential for coke to be used in blast-fu given by Mr. John Fulton, M. E., as—

I. *Hardness of Body or Cell Walls*—not Hardness and full cellular structure are softness or punkiness may be associated with

II. *Well-Developed Cell Structure*, for, other being equal, the calorific energy of a fuel is in tion to the surface exposed to the oxygen.

III. *Purity.*—Other things being equal, the in the coke, the less risk of sulphur or phospho dangerous volumes in the resultant pig-iron fi furnace. In many cases, there is danger of i the physical condition of coke by the operat washing the coal to reduce its slate. The some coals improves the coke; in others, it Washing coal carries out in the operation hydrogenous matter which aids in develo structure. The coke made from it dense; in other words, in calorific energy by the density coal would more than o

duction of ash, except in cases where the ash is excessive.

IV. *Uniformity of Quality in Coke.*—The "blackends," which are sometimes made in coking, are worse than useless in a blast-furnace; hence, a carefully prepared coke, alike all through, is most desirable for regular work. This result can be best obtained from coal inheriting a liberal ratio of hydrogenous matter to assure full oven heat and thorough coking in every part of the charge. This is one of the distinguishing features of Connellsville coke.

Coke is also employed largely in steel-works, foundries, and for manufacturing purposes. At present it is used but little on railroads or steamboats; but where the former pass through cities, coke is sometimes used as producing less smoke than other bituminous fuel. The demand for coke in the reduction of the ores and the manufacture of lead, copper and more precious metals is rapidly increasing.

Its manufacture is carried on extensively in several States, but Pennsylvania ranks first in production. Comparatively few bituminous coals produce a good quality of coke, the reason for which our present knowledge has not determined. In all processes employed the object is to expel gaseous elements and retain carbon, but the property of coking does not seem to depend on the quantity of volatile matter, nor does it appear to increase with the amount of hydrogen and oxygen.

The most careful analyses of coals show the relative proportions of carbon, ash, sulphur, etc., but do not determine whether they will make good cokes. Actual experiment is the only reliable test. Theoretically, coking coals should yield coke equivalent in weight to the carbon and ash, but, in actual coking, some hydrocarbons are produced and dispersed, and a part of the carbon is consumed. In analyses of bituminous coals the per cent. of ash, fixed carbon and two-thirds of the sulphur are usually added together and given as the percentage of coke: this theoretical yield, however, is generally considerably in excess of the actual results obtained in practice.

Coke made in retorts, in which bituminous coal is placed for the production of illuminating gas, is considered a by-product, and is generally used for domestic purposes or by comparatively small consumers, but that produced for metallurgical processes is made either in open ricks, bee-hive ovens, or Belgian ovens.

There are of course modifications of the various methods, but typical forms may be described as follows:

Open Ricks.—The coal is piled in long heaps about 5 feet in height, the top being 4 feet in width, and the sides sloping 1 to 1. At one-third of the height longitudinal and transverse flues are constructed of lump-coal and wood, and from these vertical flues, similarly formed, connect with the top of the pile. The pile is fired through these vertical flues and the progress of coking is carefully watched. In from 5 to 8 days the process is complete and from 55 to 60 per cent. of the coal piled is obtained as coke. Owing to swelling in coking from 100 to 110 bushels of coke are obtained from 100 bushels of coal.

Bee-hive Ovens are made of various sizes, but one much approved is 11 feet in diameter with vertical sides for 26 inches, covered by an arch having a rise of 4 feet, as shown in Fig. 2. These ovens are charged with 100 bushels (7600 pounds) of coal, and in 48 hours

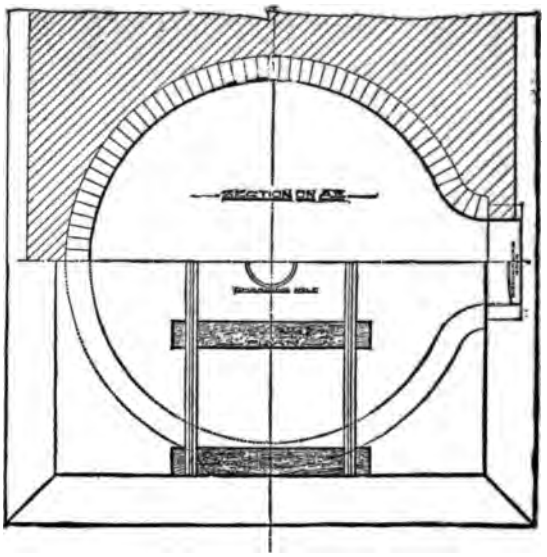


FIG. 1.—American Bee-hive Oven.—Cross Section.

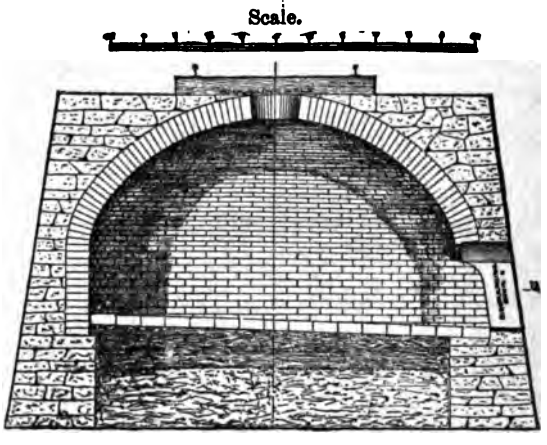


FIG. 2.—American Bee-hive Oven.—Vertical Section.

produce 120 bushels of coke (4800 pounds), or 63 per cent. of the weight of coal. Sometimes coke is made in 24 hours, and generally to avoid Sabbath work larger charges are placed in the ovens Friday and coked for 72 hours. In but few of these bee-hive ovens is any attempt made, so far as is known, to utilize the gaseous product.

The Belgian Ovens are rectangular in cross section. For one improved form of these ovens see article COKE, in ENCYCLOPÆDIA BRITANNICA. In these the resultant gases are employed to heat the ovens, so that the yield is increased and coke amounting to 70 per cent. of the coal charged is obtained. In all oven-coking deep charges give the best yield, but shallow charges produce a superior and far more desirable coke for metallurgical purposes.

Coke as ordinarily produced contains from ½ to 12 per cent. of water.

Each method of manufacture has its adherents. The Belgian ovens are most expensive, and give the largest

yield; but since the coke is generally quenched outside of the oven it carries an excess of water. A plant of Bee-hive ovens will cost from 50 to 60 per cent. of the outlay required for Belgian ovens of equal capacity, but the coke while drier is less in quantity than the Belgian ovens give. Open rick coke is more free from water than any other, on account of the water for quenching being applied in small quantities in the vertical flues in connection with a covering of fine dust to smother the fire.

A comparison of the various methods by the Geological Survey of Pennsylvania gives the following results:

	Open Ricks.	Bee-hive Ovens.	Belgian Ovens.
Yield of Coke in per cent. of Coal	59	63	70
Loss of fixed Carbon in Coking—per cent.	24	9 to 22½	10 to 13
Coal required to make 1 ton of Coke	1.67	1.58 to 1.60	1.42
Cost of making 1 ton of Coke (Coal being $1.00 per ton delivered)	$2.37	$2.18 to $2.21	$1.87
Cost (including interest on plant)—per ton	$2.37	$2.33	$2.06

A hard resonant coke with large cells and silvery lustre is most approved for metallurgical purposes; and the following table, compiled from the same authority, gives a comparison of the Pennsylvania Cokes, and we have appended a similar table of other Cokes, as well as the results of chemical analysis:

Physical Properties of Pennsylvania Cokes.

Where Made.		Grammes per cub. in.		Pounds per cub. ft.		Per cent. of Coke.	Compressive Strength. Pounds.	Height of Furnace Charge. Feet.
		Dry.	Wet.	Dry.	Wet.			
I. Bennington—Cambria Iron Co.		13.36	19.74	50.90	75.20	67.68	281	112
I. Broad Top		12.	19.59	45.72	74.52	61.25	220	88
I. Rockhill C. & I. Co. (Washed Coal)	Top	10.11	17.89	38.52	68.16	56.51	200	80
	Middle	11.66	20.22	44.42	77.04	57.66		
	Bottom	11.79	19.05	44.92	72.59	61.89		
	Average	11.18	19.05	42.59	72.58	58.69		
II. Connellsville—72 hours		12.46	20.25	47.47	77.15	61.53	284	114
" " 48 "		14.02	20.95	53.41	79.81	62.92	249	100
II. Broad Top—Kemble C. & I. Co.		11.76	20.18	44.81	76.88	58.27	240	96
III. Hollidaysburg—Cambria Iron Co.	Top	13 19	20.80	50.25	79.25	63.41	259	104
	Middle	14.22	20 61	54.18	78.52	69.		
	Bottom	16 92	22.87	64.46	86.13	73 98		
	Average	14.77	21.42	56.29	81.30	68.80		
III. Johnstown—Cambria Iron Co.—24 hours	Top	8 42	17.95	2.08	68.39	46.91	245	99
	Middle	12.96	21.	49.38	80.	61.71		
	Bottom	13.12	21.22	50.	80.85	61.78		
	Average	11.50	20.06	43 82	76.41	56.80		
III. Gap Furnace, near Hollidaysburg	Top	13.22	20.72	50 37	78.93	63.80	248	100
	Middle	13 54	20.67	51.60	78.76	65.50		
	Bott m	16 92	21.17	64 46	92 09	70 42		
	Average	14.56	21.85	55.47	83.26	66.57		

NOTE.—In the foregoing table I denotes that the coke was made in open pits. II in Bee-hive ovens and III in Belgian ovens. The per cent. of coke has reference to the bulk or space occupied, and the per cent. of cells is the difference between these numbers and 100. The compressive strength is computed in pounds per cubic inch, and is one-fourth the ultimate strength. The height of the furnace charge is the calculated maximum that can be supported without crushing.

Physical Properties of Various Cokes.

Locality.	Pounds in 1 cub. ft.		Per cent. of Coke.	Compressive Strength. Pounds.	Height of Furnace Charge. Feet.	Hardness.	Specific Gravity.
	Dry.	Wet.					
West Virginia	52.44	81.56	64.32	258	103	3.15	
Clearfield, Pa.	56 35	76.69	74.43	319	128	3.60	1.30
Cumberland, Md.	48.61	82.41	58.99	215	86	3.00	1.730
Alabama	50.70	69.01	73.17	225	87	3.50	1.403
Illinois	42.02	65.09	63.79	180	70	3.20	1.215

Chemical Analyses of Cokes.

Locality.	Fixed Carbon.	Moisture.	Ash.	Sulphur.	Phosphorus.	Volatile Matter.	Analyst.
Connellsville, Pa.	89.57	0.30	9.11	.820	.014	.460	A. S. McCreath.
West Virginia	92.18	0.11	6.68	.618	.027	.350	J. B. Britton.
Broad Top, Pa.	89.28	.....	8.66	1.060	.....	.....	T. T. Morrell.
Clearfield, Pa.	89.86	0.54	9.41	.....	.....	.667	Booth, Garrett & Blair.
Illinois.	89.77	0.12	9.58	0.930	.033	.....	T. T. Morrell.

The coke held in best repute is known as Connellsville coke, obtained from a district in Western Pennsylvania, covering an area of about 70 square miles; several other cokes, however, are probably equally as good.

The favor in which the various methods of manufacture are held is fairly shown by the census of 1880, which exhibits the number of coke ovens in the United States May 31, 1880, as follows: 9728 Bee-hive ovens; 286 Belgian ovens; 60 of other forms, chiefly modified Bee-hive; 42 pits or mounds; total, 10,116. There were building at that time 2083 Bee-hive; no Belgian; 80 other forms, chiefly modified Bee-hive; no pits; total, 2163. Grand total, 12,279. In the Connellsville region above referred to there were at the close of 1883 over 10,000 ovens, all of the Bee-hive form; in 1872 there were 2000 ovens in this district. The annual capacity of the coke ovens in the United States, allowing 10 per cent. as inactive, is not less than 5,000,000 tons, or 250,000,000 bushels.

The price of coke varies with the current wages paid labor, and with the demand, the extremes being from ninety cents to four dollars per ton. Coke is usually sold by the ton of 2000 pounds, or by the bushel of 40 pounds.

In Great Britain, as early as 1589, a patent was granted for making iron with "cooked" coal, and during the 17th century quite a number for "charring" or "charking" sea-coal for use in iron smelting, or "to burne out the sulphur and render it sweete," but all attempts to use the "cooked" coal, or coke, in accordance with these patents, were complete failures.

Early in the 18th century, whether about 1713 or 1735 seems in doubt, Abraham Darby used coke successfully in the manufacture of pig-iron in the Colebrookdale furnaces. From this dates the later history of iron-making.

The total consumption of coke in Great Britain is fully 10,000,000 tons per annum. Of this quantity very nearly one-half is produced in the county of Durham, where 14,000 to 15,000 ovens, chiefly Bee-hive

e built for its manufacture. The average yield per ven throughout the country over the whole year may e taken at about 330 tons, which would give a total 30,300 ovens, and represents a total capital expend- ure of over £2,000,000.

From 1870 to 1882 the variation in price of Durham ke was from 9 shillings to £2 5s. per ton.

As sulphur exists in all bituminous coals and but a ortion of it (from ⅛ to ½) is eliminated in the coking rocess, coals containing small percentages of this ment are preferred. Satisfactory results have been ained by washing "slack" (fine coal), or crushing and ashing coal containing considerable iron pyrites. he coal, being lighter than the slate and pyrites, oats in water while the latter sinks. This fine coal gglutinates in the ovens and produces a very fair ke. Phosphorus also is generally found in our king coals, and analyses of 93 specimens showed that is element existed from a mere trace to 0.1667 per nt. The cokes from these coals contained phos- horus from a trace to 0.2818 per cent.; the average pproximating 0.2 per cent.

With the exception of the employment of gaseous roducts in heating the Belgian ovens, there has been ntil lately little attention given to their utilization. rts are now being made, however, to collect and til the tar and ammonia resulting from the coking ocess. Among other plans for this purpose, that of meson is noteworthy.

The difference between a Jameson oven and one of e ordinary type consists principally in providing the ven with a false bottom made of perforated quarles, er which are a number of passages connecting with pi to which a gentle suction is applied by coupling an exhauster. By this means the oily and ammo- al products, instead of rising to the upper part of e oven and being there burned and consequently d, are drawn downward through the passages collected by condensation in a suitable receiver.

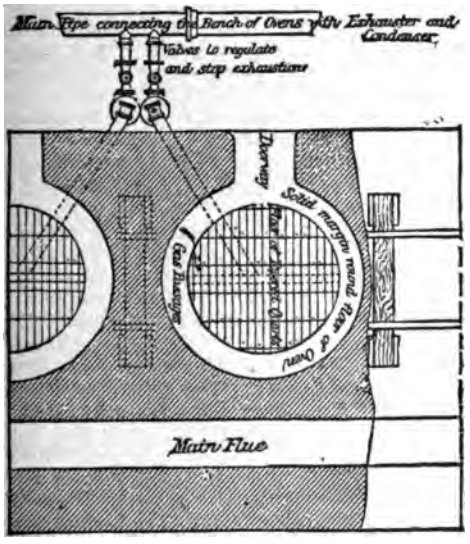

Main Pipe connecting the Bench of Ovens with Exhauster and Condenser
Valves to regulate and stop exhaustion
Doorway
Solid margin round floor of Oven
Gas Passages
Floor of Oven
Main Flue

FIG. 3.—Jameson Coke Oven—Sectional Plan.

1 3 is a sectional view of a Bee-hive coke oven as ed to the Jameson improvements. A vertical of the same is given in Fig. 4, and shows the method of arranging the false bottom, and the way in which the exhaust is effected, the pipe at the bottom being connected with the main exhaust-pipe, as may be seen in Fig. 3.

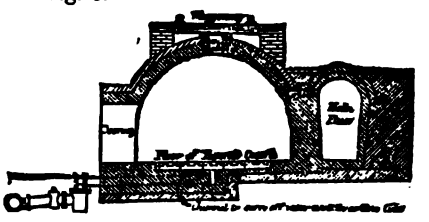


FIG. 4.—Jameson Coke Oven—Vertical Section.

The system known as "Simon-Carré" requires the building of an oven of the Belgian plan or a flue-oven, and it is claimed to produce a quality of coke which is fully equal, as a blast-furnace fuel, to that made in the ordinary Bee-hive oven, without any attempt at the re- covery of the by-products. In addition to this, the yield of the coal in coke is 75 per cent., as against 60 to 65 per cent. in the ordinary Bee-hive oven, and there are also saved in addition 30 gallons of ammoniacal liquor per ton of coal, and 7 gallons of tar, while the extra cost is only about 30 cents per ton.

In Germany a coke oven has been patented, in which, in case of interruption of the operation, some coke shafts may be thrown out, and each separate shaft utilized as a generator. The coke shafts are sur- rounded by the heating shafts, so as to isolate the former. Generators are placed on the outside of the plant, and enclose between them a channel which car- ries off the products of combustion. The heating gases passing through the generator are mixed with air, enter the heating chambers, and finally escape through proper funnels. The vapors and products of distillation developed in the coke chambers pass into a condenser, while the lighter non-condensable gases pass into a main gas channel, and may again be utilized for heating the coke chamber.

Natural Coke is reported as being found in Virginia, New Mexico, and other localities. That in Chesterfield Co., Va., is technically known as "carbonite," and its character as a true coke is disputed. A proximate analysis of dull and lustrous samples, by Dr. Drown, shows

	Dull Portion.	Lustrous Portion.
Specific gravity	1.375	1.350
Loss at 100° C.	2.00	0.69
Volatile matter	15.47	11.10
Ash (dark-brown) (white)	3.20	6.68
Fixed carbon	79.33	81.53
Sulphur	4.08	1.60

The manufacture of coke is referred to in most of the standard works upon metallurgy or upon fuels, and much valuable information is given in the *Report "L" of the Second Geological Survey of Pennsylvania*, in the special "Report on Coke," by J. D. Weeks, in the *U. S. Census of* 1880, and in the *Transactions of the American Institute of Mining Engineers*.

(J. B.)

COKE, THOMAS, LL.D. (1747–1814), the first bishop of the Methodist Episcopal Church, was born at Brecon, South Wales, Sept. 9, 1747. His father, Bartholomew Coke, was a surgeon, and was several times elected mayor of the town. Thomas was sent to Oxford when

sixteen, and entered as gentleman commoner at Jesus College. Many of his fellow-students were infidel in opinions and immoral in conduct, and Coke was for a time influenced by them, but afterwards became a sincere believer in Christianity. Returning to Brecon, he was at the age of twenty-one chosen member of the common council, and at twenty-five was elected mayor. In June, 1775, he received the degree of D. C. L., and soon after took orders in the Established Church. Being made curate at South Petherton, his preaching proved so effectual that increased accommodation became necessary, and he erected a gallery in the church at his own expense. His adopting Methodist views, however, provoked some clergymen to try to have him removed, and though the bishop refused their application, the rector dismissed him. In 1777 he became personally acquainted with Rev. John Wesley, and joined his society, and the next year was stationed in London, where he became very popular. He assisted Wesley in procuring the deed of declaration by which the Wesleyan connection is still maintained in England. After travelling through England for two years under Mr. Wesley's direction, he was appointed to preside in the first Irish conference, held in Dublin in 1782. After the acknowledgment of American independence by England, it seemed necessary to Mr. Wesley to send to this country a superintendent who should be empowered to confer ordination. For this purpose Dr. Coke was selected, and ordained Sept. 2, 1784, by Mr. Wesley and two other presbyters of the Church of England. He reached New York in December, and hastened to consult with Rev. Francis Asbury, who had formerly been appointed Mr. Wesley's assistant in America. A conference of Methodist ministers was speedily called, which fully recognized Dr. Coke's authority, and elected Asbury bishop and joint superintendent. Coke now travelled extensively through the United States, not only laboring as an evangelist, but also urging the promotion of education and collecting funds to establish a college for the training of ministers. Twice, however, the buildings erected for this purpose were destroyed by fire, and the project was abandoned. In June, 1785, Bishop Coke returned to England, and travelled through Great Britain, Ireland, and the Channel Isles. Having become deeply interested in the destitute condition of the people of Nova Scotia, he embarked in September, 1786, with three missionaries on a vessel for Halifax, but they were driven by storms to the island of Antigua in the West Indies. Here he left one of the missionaries, then visited several other islands, and in February, 1787, reached Charleston, S. C., and travelled, preaching as he went, to Philadelphia. Returning to England, he called the attention of the people of all denominations to the moral condition of the slaves in the West Indies, and succeeded in having three more missionaries sent to them. Bishop Coke accompanied these, and made a tour through the West Indies, establishing mission-stations in several of the islands. Then sailing to South Carolina, he attended several annual conferences in different States with Bishop Asbury, and returned to England in July, 1789. For the next sixteen months he was employed in raising funds to sustain the missions in the West Indies. Having succeeded in this object, he returned thither with two more missionaries, inspected the work there, and sailed to the United States. While travelling in Virginia he heard of the death of Rev. Mr. Wesley, and immediately hastened to England. At the next meeting of the English conference, in 1791, he was elected secretary, and helped in framing the system of government of the Methodist societies. He also endeavored to establish missions in France, but found his design impracticable. Mr. Wesley having designated Mr. Henry Moore, Dr. Coke, and Dr. Whitehead to prepare an account of his life, they accomplished this task in the year 1792. Bishop Coke was then requested by the conference to prepare a commentary on the Scriptures, and to this object devoted much time during the following years, without, however, intermitting his travels and inspection of the churches. He again visited the West Indies in 1793, and afterwards went to Holland to obtain the favor of the Government for missions in the islands under their control, but was unsuccessful. In 1795 he projected a mission to the Foolahs in Africa, and sent thither a company of mechanics, but the enterprise was a total failure. In 1796 he again visited the United States, and in view of the importance of the work here resolved to make this country his home; but when he went to England to settle his affairs, the conference sent an earnest request to their brethren in America to release him from his engagements, which was afterwards granted. On his voyage to America in 1797 the vessel in which he sailed was captured by a French privateer, and he was plundered of his clothing, though his books were spared. In 1798 he directed the attention of the Wesleyans to Ireland as a mission-field, and in 1800 to Wales, and in the latter the work was specially successful. Having completed his commentary on the Old Testament, he published it in 1802, and in the following year made his ninth and last voyage to America spending nearly a year in a tour through the States. After his return to England he resumed his labors in behalf of missions, and while soliciting donations secured also a wife, a Miss Smith of Bristol, with whom he lived happily for six years. About a year after her death he married Miss Ann Lexdale of Liverpool, who lived, however, only a short time. During these years he had been earnestly engaged in the mission cause and in preparing for the press a number of works besides his commentary. In 1809 he labored to procure from the Privy Council an order countermanding a law passed in Jamaica which forbade the missionaries to instruct the slaves, and was finally successful. In 1811 he established a mission at Sierra Leone, and in 1813, after a correspondence with Rev. Claudius Buchanan with regard to India as a mission-field, announced to the conference his intention to begin a mission in Ceylon. Seven preachers volunteered to accompany him, and he offered to give £6000, if necessary, for the outfit. The arrangements having been completed, the missionaries sailed from Portsmouth, Dec. 30, 1813, and Bishop Coke spent much time on the voyage in preparing hymns, sermons, and prayers in Portuguese for use in the work. On May 3, 1814, however, he was found dead in his cabin, having been ill only two days. He was buried the same day, near the middle of the Indian Ocean. His plans for the mission in Ceylon were faithfully carried out by the survivors.

Besides the *Life of Wesley*, 1792, and the *Commentary on the Scriptures*, 6 vols., 1802–07, already mentioned, he published a *History of the West Indies*, 3 vols., 1808–11, *History of the Bible*, *Life of Christ*, *Defence of the Doctrine of Justification by Faith and the Witness of the Spirit*, *The Duties of a Minister*, and numerous addresses to the churches.

COLBAN, MARIE SOPHIE, a Norw[illegible] born Dec. 18, 1814. Her maiden [illegible] and at an early age she [illegible]

an, who had lived much in Paris and thus was
to instruct her in French language and literature.
having become a widow at the age of thirty, she had
to work in order to support herself and educate
her son. She made use of her knowledge of French
by translating learned works. This gave her an occa-
sion to go to Paris, where she gained the friendship of
wealthy lady with whom she afterwards corresponded.
She was surprised one day at finding her own letters
to this lady published in a Paris journal under the
title *Lettres d'une barbare*, and thus she became an
authoress against her own wishes. She spent her
winters in Paris and her summers in Norway until a
Paris journal finally sent her to Rome as Italian cor-
respondent, and there she is still domiciled. Her real
debut in literature was *Lærerinden*, a story published in
1870. This was followed by *Tre Noveller* (1873); *Tre
Noveller* (1875); *En gammel Jomfru* (1879);
Cleopatra (1880); and *Thyra* (1882). The refinement
of the South and the grandeur of the North are ad-
mirably blended in her works.

COLBURN, ZERAH (1804–1840), an arithmetical
prodigy, was born at Cabot, Vt., Sept. 1, 1804. When
six years old he showed such wonderful power of men-
tal computation that his father decided to exhibit him
throughout the country. At Boston his talent was
subjected to the severest tests by questions involving
the multiplication by several places of figures, involution,
and evolution. These he answered correctly, though
unable till some years later to explain the mental
process by which he obtained the results. After jour-
neying through several States, Mr. Colburn in 1812
sent his son to Europe, and travelled in the same way
through England, Scotland, and Ireland. He resided
some time in Paris, and when he returned to Eng-
land young Colburn was placed in Westminster School.
In 1820 he became a teacher, and also assisted Dr.
James Young in astronomical calculations. In 1824
he returned to America, taught school, and studied at
the University of Vermont. In 1825 he became a
Methodist preacher, and served for nine years in the
ministry. In 1835 he was appointed professor of
mathematics in Norwich (Vt.) University. His autobi-
ography, published in 1833, states that his powers of
imagination failed as he approached manhood. In
other respects he displayed no special ability. He died
at Norwich, March 2, 1840.

COLBY UNIVERSITY, a Baptist college, is lo-
cated in Waterville, Me., a beautiful town on the
Kennebec, 81 miles by railroad from Portland. It had
its origin in the "Maine Literary and Theological
Institution," incorporated by the legislature of Massa-
chusetts in 1813. Rev. Jeremiah Chaplin having been
appointed professor of theology, brought some pupils
with him to Waterville in July, 1818, and in Oct.,
1819, was joined by Rev. Avery Briggs, who had been
elected professor of languages. On a lot containing 179
acres, the trees were felled to make room for the school-
building and dwelling-house. When Maine became
a separate State in 1820, the legislature granted to the
institution collegiate powers, and subsequently changed
the name to Waterville College, which it retained
until 1867, when the name was changed to Colby
University, in honor of Mr. Gardner Colby, of Newton
Centre, Mass.

In 1822 Prof. Chaplin was made President, and the
same year the college graduated its first class—of only
one member—one of whom, George Dana Boardman, became
the founder of the remarkably successful Karen Mis-
sion in Burmah. President Chaplin, by his thorough
scholarship and his persistency of purpose, was emi-
nently fitted for the work of founding a college
under peculiarly difficult conditions. By personal
solicitation he raised the necessary funds for the enter-
prise, and through thirteen years he labored only for
the college. In 1842 the Board of Trustees set up in
the old chapel a marble tablet to his memory, which
has been transferred to the new chapel in the Me-
morial Hall.

The college building known as South College was
erected in 1821. It is of brick, four stories high, with
two main entrances, and contains thirty-two rooms,
now used for dormitories, but formerly also, in part,
for recitation-rooms, chapel, and library. A similar
building was erected a few years later for dormitories,
the basement of which long served for a Commons
Hall, and a chapel.

In 1829 a preparatory school, in charge of the fac-
ulty, was opened in a building half a mile from the
college. This, with greatly improved facilities, is
known as the Waterville Classical Institute, and has
been presided over, since 1865, by James H. Hanson,
LL. D., an alumnus of the university. The university
has recently taken into a similar relation the Hebron,
and the Houlton, academies. The college also early
erected workshops, putting them in charge of a com-
petent superintendent; but after a trial of twelve
years this industrial department was abandoned.

The university now has adequate buildings in good
condition, and well furnished; an able and full faculty;
and a large body of alumni devoted to its interests.
The buildings are as follows: the North and South
Colleges, each thoroughly renovated, and the latter
being now named Chaplin Hall; Champlin Hall, con-
taining the recitation-rooms; Coburn Hall, devoted
to the use of the department of chemistry and nat-
ural history, and called after the Hon. Abner Coburn;
Memorial Hall, erected to the memory of the alumni
who fell in the late civil war, and containing the
hall of the alumni, chapel, and library; a Gymnasium,
commodious and furnished with the most approved
apparatus; the President's house; an observatory on
an eminence near by, fairly equipped and used for
purposes of instruction. The library has double al-
coves and shelves for 30,000 volumes, and now con-
tains over 18,000 volumes and 9000 pamphlets. The
present value of buildings, land, etc., is over $200,000.

The following is the list of the Presidents—the
asterisks indicating their death:

1822—1833.	Rev. Jeremiah Chaplin, D. D. *1841.
1833—1836.	Rev. Rufus Babcock, D. D. *1875.
1836—1839.	Rev. Robert E. Pattison, D. D. *1874.
1841—1843.	Eliphaz Fay, A. M. *1854.
1843—1853.	Rev. David N. Sheldon, D. D.
1854—1857.	Rev. Robert E. Pattison, D. D. *1874.
1857—1873.	Rev. James T. Champlin, D. D. *1882.
1873—1882.	Rev. Henry E. Robins, D. D.
1882—	Rev. George D. B. Pepper, D. D., LL. D.

The college has had twenty-one different professors,
eight of whom are still in office, three of the latter
having already served an average of twenty-eight
years each. Of the earlier professors, George W
Keely, LL. D., served twenty-three years, and Charles
E. Hamlin, LL. D., now of Harvard University, twenty
years. Dr. Champlin also served the college as
professor of the Greek and Latin languages and liter-
ature for sixteen years prior to his elevation to the
Presidency, making his entire service thirty-two years.

The number of the graduating class in 1882 was 33.

and that of 1883 was 34, while the total number of undergraduates (1884) is 132.

The alumni number 730,—clergymen, 219; lawyers 158; teachers, 129; professors of colleges, 34; presidents of colleges, 7; physicians, 44; journalists, 32; judges, 14; members of Congress, 8; Governors, 3. Over five-sevenths have given themselves to those callings whose chief work is that of mind on mind. Several of its graduates have become presidents of other educational institutions, and many others have filled professorships in our various colleges and seminaries, and some of them have attained high eminence in authorship; still others have attained high rank in civil and military life.

The curriculum of the college has always been of a high order, and its recitation-room drill thorough. The course, however, has been broadened with the general advance and demand of the times, especially in the departments of the natural sciences, art, history, and physical culture.

The college has sixty-nine scholarships, yielding each from $36 to $60 per year. Among the prizes is one founded by Hon. J. Warren Merrill, which yields to one student, each year, exceptionally well fitted for college, an annual income of $182. The ordinary expenses of a student amount to about $240 a year.

The entire property of the college, including $120,000, left it by Mr. Gardner Colby, amounts to about $550,000, the land, buildings, etc., being estimated at $200,000, and the invested funds being $334,946.

COLD. The common expression "catching cold" denotes facts and symptoms like the following: a person is exposed to a draught of air, and as a consequence, a few hours afterwards, there ensues a swollen condition of the mucous membrane of the nasal passages, producing more or less obstruction to the breathing, and perhaps attended with slight fever. Twenty-four hours later, or in less time, there is a discharge from the nose, which is at first thin and transparent, but soon becomes turbid and then opaque white or yellow. This catarrh continues two days or even two weeks and then disappears. Such a person is said to have had "a cold in the head;" properly he has had an inflammation of the mucous membrane of the nasal passages. Again a similar exposure or after a wetting of the body or a part of it, as the feet, a cough is acquired. The cold is then said to have settled on the chest. Similarly a hoarseness is produced, or a diarrhœa or a neuralgic pain. Should the cough become a symptom of bronchitis or pneumonia, or the diarrhœa a symptom of inflammation of the bowels, or the pain a symptom of neuritis or rheumatism, the "cold" is gradually lost sight of and the actual condition spoken of.

"Cold" is the cause of a number of morbid states, by a refrigeration as it were of the organism. It is not so much the degree of cold as the changes in temperature which produce the results referred to, these being more serious if the cooler air is in motion, and the consequences are more serious if the surface on which the draft impinges is covered with perspiration. Why it should produce such a state in one person and not in another, or a different state in a third, or in the same person at a different time, is not known. When in the same individual cold always produces a morbid state of the same organ, that organ must have a peculiar susceptibility. In some instances there is a relation between the result of the exposure and the exposed part traceable to proximity. Thus exposure of the head will [illegible] rise to a "cold in the head." [illegible] exposure of the neck sometimes gives [illegible] of the larynx, and that of the ch[illegible] But this succession is doubtful or [illegible] other hand it is well known that cold [illegible] especially when associated with moist[illegible] sore throat (pharyngitis), also derange[illegible] of struation, especially amenorrhœa, in the [illegible] it may produce any one of the affectio[illegible] due to cold.

In what way cold operates to produ[illegible] morbid states, which are almost always [illegible] is not certainly known. According to [illegible] tion, the blood is driven from the surface of the [illegible] to the internal organ affected. But why is the [illegible] turned to one organ rather than [illegible] that the organ affected is more vul[illegible] amount of blood is in part to l[illegible] has been suggested that the chilling of [illegible] causes an arrest of the cutaneous secretion. a[illegible] tion of effete matters in the blood, and a [illegible] deposit of these in the organ affected. Bu[illegible] is even more speculative than the other, and has [illegible] single fact as a basis. It is true that the cutaneous secretions are partly checked by chilling the surface, but experiment has shown that when they are totally arrested, as by covering the body with a layer of impervious varnish or with gold foil, death promptly results without the intervention of any inflammatory symptoms, but with symptoms of suffocation or such as due to the deprivation of oxygen. The varied phenomena of taking cold have also been attributed to the chilling effect directly upon the terminal nervous filaments and nerve networks of the skin, and the reflex operation of such influence upon the nerves of the internal organs affected. By paralyzing the tonic action of the vaso-motor nerves, which are distributed to the muscular wall of the blood-vessels, they cease to regulate the supply of blood to an organ; there results an excessive flow of blood to the part, which is the most important condition of inflammation. But the latest experiments go to show that nervous influence has very little to do with inflammation. We are therefore compelled to admit that we have but a partial explanation of the phenomena of colds, and must wait for a closer investigation of the facts.

The affections which cold produces are mainly acute inflammations. Indeed if we except chemical and physical irritants, it may be said to be the most frequent cause of these. On the other hand what are known as infectious diseases, including the fevers, the various contagious diseases, etc., are never produced by cold. In the case of malarial affections, though they require heat for their causation, yet it is not unlikely that cold may become the exciting cause of their manifestation.

While acute diseases are the most freq[illegible] quence of refrigeration, it is also true tha[illegible] tinued exposure to cold may cause chronic [illegible] Here again inflammations are the form of engendered, and among these those of the membranes covering the lung (pleura) a[illegible] the [illegible] (pericardium), the peritoneum, the conspicuous.

In some instances it is easy to t[illegible] inflammatory affection to cold as t[illegible] an uncomfortable condition succe[illegible] without interruption into that of [illegible]

tion; or when a chilly feeling continues until it is
eeded by the diseased conditions, with the first
anifestations of which it often alternates; at other
s the victim is able to recall the occasion on which
fered the refrigeration, when the sore throat or
h presents itself, though he may in the mean-
have forgotten it. But in many cases it is im-
ble to trace the result to cold. (J. T.)

COLDEN, CADWALLADER (1688–1776), a New
rk physician, naturalist, and statesman, was born
Dunse, Scotland, Feb. 17, 1688. His father, Rev.
lexander Colden, prepared him for the University of
linburgh, where he graduated in 1705. He then
died medicine, and in 1706 settled in Philadelphia
a physician. He went to London in 1715, and was
received with favor by the Royal Society, but on ac-
count of the troubles in Scotland he returned to Amer-
after his marriage. In 1718 he removed to New
at the request of Gov. Hunter, and soon after
obtained a patent for land at Coldenham, nine miles
from Newburgh. He was appointed the first surveyor-
ral of the province and master in chancery. He
a route for trade from New York to the Mis-
by way of the Susquehanna, Juniata, Alle-
, and Ohio Rivers. In 1720 he was appointed
ov. Burnet member of the council. In the fre-
nt controversies with the assembly Colden was an
t supporter of the authority and claims of the
governors in opposition to the people. In 1760
was appointed lieutenant-governor, and remained in
s office till his death, frequently acting as governor
ng vacancies. In 1765 he was burnt in effigy by
Sons of Liberty on account of his efforts to enforce
Stamp Act, and was compelled at last to pledge
not to use the stamps. When the British
took possession of New York in 1776, a fire
e out which destroyed a large part of the city.
Colden, then eighty-eight years of age, was so
ch agitated at the sight that he died in a few hours,
ct. 21, 1776. He was the first English writer con-
ed with New York. In 1727 he published a *His-
y of the Five Indian Nations of Canada*, which was
erwards reprinted in London, with additions in 1747,
again in 1755. In this work he called special at-
ion to the advantages which would accrue from
sh trade and alliance with these tribes. A tract
on yellow fever in 1743 led to important sanitary
ions in New York City. He was eminent as a
ist, and besides introducing the Linnæan system
botany into this country, furnished to Linnæus
arly 400 American plants. His description of them,
ed by the great botanist in the *Acta Upsalensia*,
irst botanical treatise written in North America.
nnæus named an East Indian plant *Coldenia* in his
nor. The work on which Colden bestowed most
or was *The Principles of Action in Matter, to which
added a Treatise on Fluxions*. He maintained an
sive correspondence with scientific men in Europe
America. In one of his letters to Franklin he de-
ibed a process of stereotyping. The Colden papers
part of the valuable manuscript collections of the
w York Historical Society. Among them is a long-
nued series of daily observations of the thermom-
barometer, and the winds.

COLDEN, CADWALLADER DAVID (1769–1834), a
w York lawyer, grandson of Cadwallader Colden,
b at Flushing, N. Y., April 4, 1769. His
id Colden, excelled in mathematics and nat-
y. The son completed his education in
London, returned to the United States in 1785, and
began to study law. He practised in New York, and
was for a time district attorney. In 1818 he succeeded
De Witt Clinton as mayor, in 1820 was elected to Con-
gress, and in 1824 to the State senate. He took great
interest in common-school education, in the reformation
of juvenile offenders, and in the internal improvements
of New York State. He died at Jersey City, Feb. 7,
1834. He published a *Life of Robert Fulton*, 1817,
and an account of the New York canals.

COLD HARBOR, a locality in Hanover co., Va.,
where five roads meet; 9 miles E. N. E. from Rich-
mond, and about 2 miles north of the Chickahominy
River, where was fought one of the bloodiest battles
of the civil war in America, June 3, 1864. The name
of the place indicates that it was a way-side shelter
without fire. The ground on which the battle was
fought was very nearly the same as that of the battle
of Gaines' Mill (June 27, 1862), only here the posi-
tions were reversed. Pursuing his original plan in
this campaign, Gen. Grant marched upon the Con-
federate army under Gen. Lee, attacking in front, and
then attempting to turn his right flank, which Lee,
sustaining the attacks, constantly refused. Thus the
Federal forces were on a more extended line, attacking
an entrenched force, while Lee, on an inner line, with
fewer troops, could repel, strike counter-blows, fall
back, and contract his defence. After some move-
ments of this character, Grant found it necessary to
shift his base of supplies from Port Royal on the
Rappahannock to White House on the Pamunkey;
while Lee slowly but constantly fell back to cover the
defences of Richmond, until his left rested on the
Chickahominy. His army, numbering in all 69,000
men, lay north of the river, and had in its front tan-
gled thickets and marshes. It consisted of the com-
mands of Ewell, Longstreet, and A. P. Hill, with a
large contingent of cavalry on the wings, portions
of which were detached from time to time to make
raids upon the Federal communications. The Army
of the Potomac was composed of the Sixth corps, under
H. G. Wright; the Second, under Hancock; the
Fifth, under Warren; the Ninth, under Burnside, and
the Eighteenth, under Gen. W. F. Smith, which was
temporarily detached from Gen. Butler's Army of
the James and joined the Army of the Potomac May
30. These amounted in all to about 150,000 men.
Gen. Sheridan commanded the cavalry, and under
him were Gens. Torbert and Wilson. To beat up
the new quarters of the enemy, Sheridan led the
advance with two divisions of cavalry, May 26, fol-
lowed by Wright with the Sixth corps. They reached
the Pamunkey and crossed at Hanovertown on the
27th, without opposition. On the next day the whole
army having crossed was placed in easy communica-
tion with the new base at White House. The new
line of Gen. Lee, covering the railroad communications,
extended from beyond Mechanicsville towards Han-
over Court-House, and faced northeast. Grant made
strong reconnoissances, the cavalry leading the way,
and frequently fighting dismounted. Following these
the corps were advanced, and this led to a preliminary
battle. Hancock's (Second) corps, supported by the
Ninth and the Sixth, carried the enemy's outer line of
rifle-pits, but were debarred from a further advance.
Warren's (Fifth) corps encountered equal resistance
in the vicinity of Shady Grove church, from Ewell's
entire force, which endeavored indeed to turn War-
ren's left; and other troops were drawn into the

struggle. All this proved Lee's position to be exceedingly strong, but Grant persevered in his intention to break the enemy's line. On May 31 Torbert's cavalry had been ordered to occupy Cold Harbor, and to hold it against all odds. The Sixth corps was marched rapidly by the rear and flank to relieve the cavalry in its occupation; the Eighteenth corps under W. F. Smith was ordered to the right of the Sixth, and Hancock was moved to the extreme left of the line. Warren's corps formed a very extended line; and when Burnside moved from the right to close in upon him he was vigorously attacked; the enemy, taking advantage of the delay in closing the gap, routed a portion of Burnside's troops and took 600 prisoners; but soon the formation of the line was completed. In the meantime Smith's (Eighteenth) corps, with the right of Warren's, advanced, and carried the first line of rifle-trenches, but was stopped by the second line, and had to entrench themselves. The two corps lost 2000 men. Such were the movements in coming into position; such the preliminaries to the great battle of COLD HARBOR. On the evening of June 2 the Federal line extended from Cold Harbor to Bethesda Church, six miles, in the following order from left to right: Hancock, Wright, W. F. Smith, Warren, and Burnside. Two divisions of Sheridan's cavalry covered the roads to White House, and held the lower crossings of the Chickahominy. A general assault upon Lee's positions was ordered along the whole line for Friday, June 3, at 4½ A. M.; each command was to move directly to the front without regard to the rest; the sole duty of each was to attack vigorously in front. In all the corps but one the order was obeyed with no appreciable delay; but the enemy was ready at every point. The battle raged along the fronts of the Second, Sixth, Eighteenth, and Fifth corps. Hancock on the extreme left advanced Barlow's division on the left and Gibbon's on the right, with Birney in support. Barlow's attack was successful, but Gibbon's men found a swamp in their front, which divided and thus weakened and delayed the attack. The enemy being rapidly reinforced in Barlow's front, and finding him unsupported, drove him back by a furious charge. A part of Gibbon's division succeeded in reaching the enemy's parapet, but were soon driven back by numbers. In less than an hour Hancock had lost 3000 men. Similar was the fortune of the Sixth and the Twelfth corps. They reached the enemy's works under a terrible fire, but were driven back, and made haste to entrench themselves quite near to the enemy. Warren's Fifth corps presented so extended and thin a front that he could attempt nothing more than to hold his own, which he succeeded in doing. The Ninth corps under Burnside, forming the extreme right, for reasons not explained, did not join in the general front assault at daybreak, but two divisions were moved round to assail the enemy's right flank, and one brigade was engaged at the Eastern end of the Shady Grove road. The batteries of these divisions were well posted and did good work. While the general engagement was in progress there was also a spirited cavalry combat, beyond the right of the line, between the Federal command of Wilson and the Confederates under Wade Hampton. When by afternoon Burnside was in position to attack in front, the fighting was over, and the movement was suspended. The short but very bloody work of the morning had proved to the men themselves the utter hopelessness of another attack, and when Gen. Meade sent instructions to the corps commanders to renew the attack, and orders were given to the troops, in the words of Swinton "no man stirred, and the immobile lines pronounced a verdict, silent yet emphatic, against further slaughter." There was no attempt to enforce the orders. This deserves notice as a curious and unusual illustration of Marmont's paradox, "Men do not go to war to be killed. . . . . Let the moment come when an intelligent mass has before it no probability of victory, no chance of a glorious combat,—from that moment they hesitate to compromise their lives and seek to preserve them for an occasion when they will be able to accomplish the sacrifice more usefully."

The first thought of Grant on the evening after the battle was to entrench in the position he held and begin siege operations. He says: "From the proximity of the enemy to his defences around Richmond it was impossible by any flank movement to interpose between him and the city." He soon altered his views as to entrenchments, and determined on a change of base, and a new line of operations south of the James River; hoping by the sudden capture of Petersburg to cut the southern communications and make a close investment of the capital. The Federal losses at Cold Harbor amounted to over 7000 men; those of the enemy being small in comparison. The entire losses of the Union army from the 1st to the 10th of June, killed, wounded, prisoners, and missing, were 13,153. (H. C.)

COLD SPRING, a village of Putnam co., N.Y., is on the E. bank of the Hudson River, 52 miles N. of New York, on the Hudson River Railroad. It has three hotels, a weekly newspaper, five churches, three schools, and is lighted with gas. It is near West Point, and contains iron works and a gun-foundry. Population, 2111.

COLD-WATER, the county-seat of Branch co., Mich., is on Coldwater River, 156 miles E. of Chicago, on the Michigan Southern Railroad. It has an opera-house, a public hall, two hotels, two National banks, one weekly and one semi-weekly newspaper, six churches, three schools, besides the State school for indigent children. There is also a fine private art-gallery. The industries comprise three flour-mills, eight cigar-factories, two foundries, manufactures of staves, chairs, furniture, sashes, fanning-mills, and cigar boxes. The city is lighted with gas and has a park. It was settled in 1830, and incorporated in 1861. Population, 4681.

COLE, SIR HENRY, K. C. B., an English writer, was born at Bath, July 15, 1808. He was educated at Christ's Hospital, and in 1823 entered the civil service, becoming some time later an assistant keeper of the public records. He published *Henry VIII's Scheme of Bishopricks*; *Miscellaneous Records of the Exchequer*; *Light, Shade and Color*, etc. Under the pseudonym of "Felix Summerly," he prepared some guide-books, etc. He also edited *The Guide*, the *Historical Register*, and the *Journal of Design*. He took prominent parts in the great Industrial Exhibitions of London and Paris, and was superintendent of the South Kensington Museum from 1860 to 1873. He has devoted much attention to industrial decorative art, to education, to musical training, sanitary reforms, especially to the questions of water-supply and river-pollution. He was made a K. C. B. in 1875. He died April 18, 1882.

COLE, THOMAS (1801–48), an American

was born in Lancashire, England, Feb. 1, 1801. ue to the United States about 1819, with his her, who settled at Steubenville, Ohio. In 1822 he was an itinerant portrait-painter, but he was not successful, and he afterwards devoted himself to ape painting in Philadelphia. He removed to New York city in 1825, after he had experienced several years of poverty and adverse fortune. His enthusiasm was excited by the scenery of the Hudson, and he painted autumnal landscapes of the Catskills, which readily procured for him prosperity and fame. He visited Europe in 1829, passed some time in London and Italy, and returned in 1832, bringing several Italian landscapes. He made a second visit to Europe in 1841. His allegorical pictures were popular, especially a series of four, called The Voyage of Life. Among his works are another series of five pictures, called The Course of Empire, A Dream of Arcadia, The Expulsion from Paradise, Catskill at Sunset, The Hunter's Return, Home in the Woods, The Mountain Ford, A View of Mount Etna, Il Penseroso, and The Angel Appearing to Shepherds. He died at Catskill, N. Y., Feb. 11, 1848.

COLE, Vicat, an English landscape-painter, who was born at Portsmouth in 1833. His father, George Cole, was a painter of some note in his day, and from the son received his first instruction. Cole first exhibited in 1851, and he has been a frequent contributor to the exhibitions of the Society of British Artists, the Royal Academy, and so forth. He was elected an associate of the Royal Academy in 1870. Among his pictures are Under the Greenwood Tree, Flowers from the Beeches, Summer's Golden Crown, Sitting down to Camelot, Sunshine Showers, April Love, A Misty Morning, Summer Rain, The Heart of Surrey, The Day's Decline, Showery Day, and A Surrey Pastoral. Cole has mainly devoted himself to the delineation of Surrey scenery. His pictures are marked by imaginative qualities, but they are careful and pains taking renderings of nature.

COLEMAN, Lyman, D. D. (1796–1882), an American educator and author, was born June 14, 1796, in Middlefield, Mass., where his father was a physician. He graduated at Yale College in 1817, and for three succeeding years was principal of the Latin grammar-school at Hartford, Conn. He then became a tutor at Yale for four years, studying theology at the same time. In 1828 he was ordained pastor of the Congregational church in Belchertown, Mass., and held the charge for seven years. He served as principal of the Burr Seminary, Vermont, for five years, and then as principal of the English department of Phillips Academy for five years. The years 1842–43 he spent in Germany in study and in travel, and on his return was made professor of German in the College of New Jersey at Princeton, from which he received the degree of S. T. D. He was afterwards connected with literary institutions at Amherst, Mass., and Philadelphia, until 1856, when he went abroad, travelling through Europe and visiting Egypt and the Holy Land. After his return he became professor of ancient languages in Lafayette College at Easton, Pa., where he remained until his death, March 16, 1882. Dr. Coleman was the author of numerous works, the most important of which are—*Antiquities of the Christian Church* (1841); *Ancient Christianity exemplified, or the Life of Primitive Christians and the Institutes of Primitive Church* (1844); *Historical Geography of the Bible* (1850); *Ancient Christianity exemplified, or the Life of Primitive Christians and the Institutes of Primitive Church* (1852); and *Historical Text-Book and Atlas of Biblical Geography* (1854; revised ed. 1859).

COLENSO, John William, D. D. (1814–1883), English colonial bishop of Natal, was born at Austell, Cornwall, Jan. 24, 1814. He was educated at St. John's College, Cambridge, where he was graduated in 1836 as a senior wrangler and Smith prizeman. He at once became a fellow and one of the tutors of his own college. From 1838 to 1842 he was an assistant master at Harrow. In the latter year he returned as an instructor to Cambridge, where he remained until 1846. He was especially proficient in mathematical studies. During these years of instruction he issued treatises on arithmetic and algebra, which were very generally used in the schools and colleges. Later he produced (1848) *Miscellaneous Examples in Algebra*, and *Plane Trigonometry* (1851). In 1846 he was appointed rector of the parish of Forncett St. Mary in Norfolk, and devoted himself to the interests of the laboring classes; he published a volume of *Village Sermons* in 1853, and in the same year was created bishop of Natal. His first impressions of this colonial see are set forth in his *Ten Weeks in Natal* (1855). With great industry he set to work to learn the Zulu language, and before long prepared a grammar and dictionary and made a translation of the English Prayer-Book and a portion of the Bible, printing them in his own house. The peculiar customs of the natives, and especially the practice of polygamy, caused him to consider how far they should be obliged to conform to English canon law in accepting Christianity. In a memorial to the archbishop of Canterbury, presented in 1860, he took ground against compelling those already having more than one wife to renounce the authorized polygamy as a condition to baptism, finding no warrant for such compulsion in the gospel or in the ancient Church. The attention drawn to him by this memorial was increased by his new *Translation of St. Paul's Epistle to the Romans, Commented on from a Missionary Point of View* (1861), in which objection was made to the doctrine of eternal punishment. But even the feeling excited by this was insignificant, compared with that caused by his next publication. According to his own account, while engaged in the work of translating the Scriptures, he had become convinced of the improbability of many statements of facts and numbers in the historical books, and after ample study of the most recent critics had determined to return to England to publish his views. The First Part of his work on *The Pentateuch and the Book of Joshua, critically examined*, appeared in 1862, and was immediately followed by a storm of remonstrance. The book was written for the people as well as the theologians, and it passed rapidly through several editions. The English bishops entreated him to resign his see, and when he refused, some of them inhibited him from preaching in their dioceses. He bore all meekly, preached where he was invited to do so, and went on steadily with his work, a second part of which appeared in 1863. Upon this the House of Convocation of the province of Canterbury took action, and in 1864, by a majority, voted to censure him; and he was declared to be deposed from his see by Bishop Gray, of Capetown, who claimed to be the metropolitan of South Africa. He appealed from this judgment to the Privy Council, who in 1865 declared the deposition to be "null and void in law," on the ground that where a colony had an independent legislature the government had not the power to create a bishopric or act judicially upon it. But the trustees of the Colonial Bishoprics' Fund, declaring that he could not coerce them, refused to pay him his appointments. On an appeal to the Court of Chancery in October, 1866, they were

directed to pay him arrears and interest, the master of the rolls further declaring that the payment must continue unless the bishop should be presented for heresy. In the meantime just previous to his return to his diocese in August, 1865, his friends had presented him with £3300 as a testimonial. By this time he had published five parts of his work; *Part VI.* followed in 1871, and *Part VII.* in 1879. The publication of *Part I.* had great effect on the Biblical scholars of the continent, especially on Kuenen, who was led to make essential modifications in his theory of the composition of the Pentateuch.

Though Bishop Colenso resumed his missionary work in Natal, many members of the Church of England there had become disaffected towards him. In 1866 Bishop Gray publicly excommunicated Colenso, and in 1869 consecrated Dr. W. K. Macrorie as bishop of Maritzburg to rule practically the same diocese. In 1874 Bishop Colenso again visited England and reported the condition of affairs to the archbishop of Canterbury. Throughout his missionary career he had not only sought the conversion of the natives to Christianity, but had contended for their protection from the encroachments of the whites. This course had the effect of greatly reducing the number of his adherents; but still, in spite of the censure of high officials, the bishop and his daughter made constant protest against every public and private oppression of the Africans. The native chiefs Langulibalele and Cetywayo in especial found in them active sympathizers, though their efforts were often baffled. Bishop Colenso died at Durban, Natal, June 20, 1883. Besides his chief work he published *The New Bible Commentary Critically Examined* (1871–74), *Lectures on the Pentateuch and the Moabite Stone* (1873), and a volume of *Sermons* (1873).

COLERIDGE, DERWENT (1800–1883), an English clergyman and educator, son of the poet Samuel T. Coleridge, was born at Keswick, Sept. 14, 1800. He was educated first at a private school, and then at St. John's College, Cambridge, where he contributed to *Knight's Quarterly Magazine*, under the name of "Davenant Cecil." He took orders in 1826, but having already been engaged in education, continued in such work and became in 1841 principal of St. Mark's College, Chelsea. While holding this position he was made a prebendary of St. Paul's cathedral, and afterwards rector of Hamwell, Middlesex. In 1864 he resigned his principalship, but continued to receive some private pupils. He died at Chelsea, September, 1883. He collected and published the scattered writings and correspondence of his father, and edited the works of his brother Hartley Coleridge, whose life he wrote. He also wrote a biography of W. Mackworth Praed. His principal original work is *The Scriptural Character of the English Church* (1839). He was highly esteemed for his genial disposition, and was noted for his extensive linguistic acquirements, being able to converse in fourteen languages.

COLERIDGE, JOHN DUKE, BARON, an English jurist, a son of Sir John Taylor Coleridge, was born Dec. 3, 1821. He was educated at Eton, and Balliol College, Oxford, where he graduated B. A. in 1842 and M. A. in 1846. Having been called to the bar at the Middle Temple in November, 1846, he became the leader of the Western Circuit. He was appointed recorder of Portsmouth in 1855, and was created a Queen's counsel in 1861. In July, 1865, he was elected to parliament for Exeter, which he co to represent till 1873. In December, 1868, he pointed solicitor-general, and received the h knighthood. He became attorney-general in ber, 1871, and Chief Justice of the Court of Pleas, Nov. 19, 1873. In the following mont raised to the peerage. In 1880 he was ma Chief-Justice of England. In 1883 he mad tended visit to the United States, where he ceived with great cordiality, especially by the and bar. He has contributed to the *Edinburg* and other periodicals. He is one of the speakers on the English bench, and in read ably has no superior.

COLES, EDWARD (1786–1868), second gov Illinois, was born in Albemarle co., Va., Dec. His father, John Coles, a wealthy planter, ha colonel in the Revolutionary war, and, thou public life, was intimately associated with a guished Virginians of his time. Edward was at Hampden-Sidney College, and afterwards at and Mary College, leaving the latter in 1807 on of an accident. He became private secretary dent Madison in 1809. Impressed with the slavery, he wrote to Jefferson in 1814, urgi use his influence for the emancipation of the Virginia, but the veteran statesman, while com the object, declined to lead the movement. Mr. Coles, resigning his position as secretary, t through the North-west Territory to St. Lo upon his return was sent by the President on a mission to St. Petersburg, which gave h tunity for travel in Europe. In 1810 he again the Territory of Illinois, and attended the con held at Kaskaskia to form a State constitution following April he removed to Edwardsville, Ill all his negroes, setting them free and giving ever of a family 160 acres of land. President Mon pointed Mr. Coles registrar of the land-office a wardsville. Having thus become well known t people, he was brought forward in 1822 as an slavery candidate for governor, and owing to a di among his opponents was elected, while the had a pro-slavery majority, and by unscrupulo ures called a convention to alter the constitu to legalize slavery. Gov. Coles exerted prevent this change, and by arduous labor su in having the convention voted down, but was persecuted by its advocates. Throughout hi tration Gov. Coles conducted himself with di firmness, attending personally to all the details o office and making judicious recommendations t islature for the improvement of the State and fare of the people. He specially urged that e nant of slavery should be abolished, and th should be made for the security and prote colored persons. In May, 1825, he had of bidding welcome to La Fayette on his tour the United States, having made his acqu in Europe. After the expiration of his te tinued to live at Edwardsville, cultivating an and was the founder of the first agricultu Illinois. In 1831 he was a candidate for Con on account of his well-known opposition to Jackson was defeated. About the end of 183 moved to Philadelphia, where he was married N 1833, to Miss Sally L. Roberts. Here he resi rest of his life, taking interest in public a

th distinguished men, but holding no
he read before the Historical Society
a *History of the Ordinance of 1787.*
ladelphia, July 7, 1868. Hon. E. B.
published a *Sketch of Edward Coles*
very Struggle of 1823–24 (Chicago,

nus of plants of the labiate order,
..fty species, mostly herbaceous, or
ough some of the kinds are of a
habit of growth. These plants are
ca, Arabia, India, the Malay Archi-
mon Islands, and other regions near
o of the species, *C. barbatus* of Egypt
C. aromaticus of India, are used in
as deobstruents and remedies for
and asthma. Several species, such as
l *C. blumei*, and many varieties, are
plants," their brilliantly colored leaves
favorite plants for massing in beds or
arious kinds of Coleus are nearly all
ture, and they are among the readiest
pagate themselves by cuttings, even
attention on the part of the gardener.
eus tuberosus is cultivated for the food
r.

HUYLER, an American statesman, sev-
President of the United States, was
rk, March 23, 1823. His grandfather,
lfax, of New Jersey, was, at the close
nary war, in command of Washing-
fe-guards. In 1836 Schuyler removed
and step-father, Mr. Matthews, to St.
, where he has ever since resided. In
shed, at South Bend, the *St. Joseph*
of which he was editor and proprietor
47 he was chief secretary of the River
nvention at Chicago, and in 1848 was
Whig National Convention. In 1850
r of the State Convention which formed
tion for Indiana, and actively but un-
osed the clause in it prohibiting colored
ettling in the State. He was a Whig
ngress in 1851, but was defeated; in
gain secretary of the Whig National
e joined the Republican party at its
4, and was immediately elected to Con-
nued by successive elections to represent
il 1869. His speech on the "Conflict
y and Freedom in Kansas," delivered
ulated to the extent of a million copies.
Speaker of the House of Representa-
er, 1863, and during the civil war, and
ern reconstruction, exercised consider-
n legislation. In 1865 he crossed the
stage-coach, in company with some
r to report to the public on the feasi-
road to the Pacific, and to study the
cific coast. He afterwards lectured on
roughout the country. While still
House, he was in 1868 nominated and
esident on the ticket with Gen. Grant.
r the Senate until March, 1873, being the
r elected to preside over both branches
n Congress. Towards the close of his
resident, the House of Representatives
mittee to investigate charges of corrup-
mbers of the House in connection with
ilier of America, a company which had
constructed the Union Pacific Railroad. The report of the committee implicated several members in having received stock of the company under circumstances of impropriety. Among these was Mr. Colfax, who, however, strenuously denied having been involved in the business. The committee recommended no action in his case, as he was not then subject to the jurisdiction of the House, and none was taken. In 1873 Mr. Colfax retired from political life, and has since been prominent as a public lecturer.

COLLATERAL SECURITY is a term often used in modern commerce. Collateral security is a separate obligation like a bond, or negotiable bill of exchange, delivered by a debtor to his creditor to secure the payment of his own obligation, which is represented by an independent instrument. It stands by the side of the principal promise as an additional means for securing the payment of the debt. A great variety of obligations are given for this purpose. Obviously, such security means something beside an additional promise of the debtor. In the ordinary course of banking, when a customer pledges collateral, it is usual for the pledgor in his principal note to state what collateral securities have been deposited and the terms on which they may be sold and made otherwise available on default. Such a pledging of them does not affect the negotiability of the principal note. A great variety of instruments are pledged as collateral security, the chief of which are bonds, stocks, mortgages, notes, bills of exchange, bills of lading, and warehouse receipts. A very considerable body of law has grown up relating to these securities.

COLLEGES OF AMERICA. Of the colleges now existing in the United States 2 were founded in the seventeenth century, and 22 in the eighteenth. In the present century their multiplication has been rapid. Three were organized in the first decade, 7 in the second, 12 in the third, 25 in the fourth, 31 in the fifth, 71 in the sixth, 75 in the seventh, and 48 (estimate) in the eighth. The larger number of those established in this century are found west of the Hudson River.

For more than fifty years after its foundation, in 1636, Harvard was the only college in America. In it, therefore, is the history of the earliest period of collegiate education represented. It was established by a vote of the General Court of Massachusetts Bay, which agreed to give £400 towards its endowment. In 1638 this endowment was more than doubled by the bequest of John Harvard, who left half of his whole property and his entire library (about 300 volumes) to the college. The action of the General Court was only the representative action of the colonists. Of the 20,000 persons who landed in New England before 1643, it is estimated that more than 100 were graduates of either Oxford or Cambridge University. The large proportion of the 100 were residents of Massachusetts Bay. They were scattered through the score of towns among a population of perhaps 9000, from Hingham on the south to Down on the north, and to Springfield on the west. Although their poverty was great and their hardships severe, yet, possessed themselves of a liberal education, they determined that their children should enjoy a like privilege. The college they founded was similar to that with which they had been acquainted. It was unlike the University of Scotland, or of the continent. It was the college of the English university endowed with the rights of the university. It conferred de-

grees as well as gave instruction. The name college is, in general, according to American usage, synonymous with university. A university is usually only a college; but in certain cases the term university is more properly used to include the college and other schools, as professional, which are associated.

Colleges or universities are incorporated institutions. The legal body bears different names, in different institutions, as trustees, overseers, fellows. It is a self-perpetuating body. It has to do with all the affairs of the institution, administrative and scholastic. In the government of many colleges is also associated another body, which is specially concerned with the election and dismission of the officers of instruction. This body is chosen either by the alumni or by other electors representing those interested in the management. In certain colleges also, the governor, or other officers of the State, are *ex-officio* members of the governing boards. The relations of the State to the colleges in general is becoming less intimate. In not less than seventeen States, however, is established a university which is under the immediate supervision of public officers, and forms a part of the system of education.

The history of the course of study shows a constantly increasing number of subjects taught. Each college, with but few if any exceptions, demands either an examination or its equivalent, for admission. The conditions of admission in the seventeenth century were few. Latin was the chief requisite. To matriculate at Harvard it was necessary to know "so much Latin as was sufficient to understand Tully, or any classical author, and to make and speak true Latin, in prose and verse"—a kno which is at the present day not common eve graduates. The student was also required able to decline "perfectly the paradigms Greek nouns and verbs"—a smattering wh first year's course in the preparatory scho now give. The studies of the course, which covered only three years, remained substanti same throughout the seventeenth century. first year they comprised "logic, physics, et syntax, and practice on the principles of gr in the second, "ethics, politics, prosody, and practice of poesy and Chaldee;" and in the "arithmetic, geometry, astronomy, exercises i composition, epitome, both in prose and ve brew, and Syriac." History was also studie winter, and botany—such a science as then exis the summer. Rhetoric was also taught by lect every year, and each student was required to once a month. Other exercises there were bo literary and religious character. In the ser public prayer, conducted twice daily by the pre it was the rule that in the morning students translate a portion of the Hebrew of the Old ment into the Greek, and in the evening tha should render a portion of the English of th Testament also into its original language. Eac was also required to study theology in a form pr not unlike that of the Westminster Catechism. following tabular view represents the nature, and degree, the method of conducting the studies college of the seventeenth century:

	Class.	8–9.	9–10.	10–11.	1–2.	2–3.	3–4
Mon.	Freshmen	Logic & Physics.			Disputations.		
	Junior-Sophisters		Ethics, Politics.			Disputations.	
	Senior-Sophisters			Arith. & Geom.			Disputa
Tues.	Freshmen	Logic & Physics.			Disputations.		
	Junior-Sophisters		Ethics, Politics.			Disputations.	
	Senior-Sophisters			Arith. & Geom.			Disputa
Wed.	Freshmen	Gr. Etymology and Syntax.			Gr. Grammar.		
	Junior-Sophisters		Gr. Prosody and Dialects.			Greek Prosy, Disputations.	(Gr. Gra
	Senior-Sophisters			Greek Theory.			Prose A
Thu.	Freshmen	Heb. Grammar.			Bible.		
	Junior-Sophisters		Chaldee.			Ezra & Daniel.	
	Senior-Sophisters			Syriac.			Treatise, New Tes
Fri.	Freshmen	Rhetoric.	Declamations.				
	Junior-Sophisters		"				
	Senior-Sophisters		"		Vacant.	Rhetoric.	
Sat.	Freshmen	Divinity Catechetical.	Commonplaces.		History in Winter. Botany in Summer.		
	Junior-Sophisters		"				
	Senior Sophisters		"				

In the first quarter of the eighteenth century the course of study was both enlarged and improved. Although the practice of speaking Latin had ceased, Virgil and Cicero had been introduced into the curriculum. The seniors were admitted to the study of astronomy, but had not advanced beyond the need of the arithmetic and geometry of the earlier period. At Harvard, also, Cæsar and Horace were not included in the course till about the middle of the century, and Terence and Homer came to form a part of it yet later. About the same time, the middle of the century, the officers of Yale College altered the relative importance of studies. Logic was made to give way to natural philosophy and mathematics. Conic sections, fluxions, surveying and navigation began to be taught. The most comprehensive scheme of study of lege of this century was that of the University o sylvania. From its foundation in 1755 the sc most liberal. The course in mathematics wa tended as is now found in many institutions, a sics and chemistry occupied a large part of the years. In Greek the Iliad, Pindar, Thucyd tetus and Plato; and in Latin Juvenal, Hora tilian, Cicero's philosophical works, as well as h tions, formed the principal text-books. To close of the century the course was in all c yet more comprehensive, and assumed a new with a few additions and improvements was the next forty years. Classical studies ma the first three years, and metaphysical

Arithmetic was a freshman study; algebra and other branches of mathematics were taught in the sophomore year. Much attention was paid to elocution. French began to be taught. In 1803 the conditions for admission to Harvard College had been so far increased that an examination in Dalzel's *Collectanea Græca Minora*, the Greek Testament, Sallust, Virgil, and Cicero's *Select Orations* was required. The grammar of the Latin and Greek, geography and arithmetic were also included among the requisites for entrance. For fifty years the changes in these requirements were slight. Since 1870, however, these requirements have been greatly raised, and in most colleges the candidate for the freshman class is examined in six or eight orations of Cicero, six books of the Æneid, three or four books of Xenophon's Anabasis, two or three books of the Iliad, in arithmetic, algebra, and plane geometry, besides the grammar of the Latin and the Greek, and several English studies. In a few institutions a knowledge of either elementary French or German, and of some science, as well as of some other minor subjects, is required; in other institutions the knowledge demanded covers a smaller field.

The expansion of the curriculum has kept pace with the expansion of the subjects of the entrance examinations. The enlargement of the course of instruction is the result to a considerable degree of the system of elective studies. The so-called elective system is a method by which a student is allowed to choose, to some extent, the subjects he pursues, yet is required to choose certain subjects. Perhaps the first institution to introduce the system was the University of Virginia, founded by Jefferson in 1819. Through the efforts chiefly of George Ticknor, Harvard in 1825–26 and 1826–27 permitted the student to elect about one-quarter of his work, with the exception of the first third of the freshman year. The range of electives indicates the breadth of the curriculum. In the first year it embraced Latin, Greek, and modern languages; in the second, these subjects and mathematics; in the third it was enlarged by the addition of Hebrew; and in the fourth, Greek, Latin, mathematics, chemistry, mineralogy, geology, and modern languages. The elective system continued for somewhat more than a score of years, and in 1856, after a gradual lessening of the number of optional studies, the order of required studies was restored. Since the year 1867, when the elective system was again introduced at Harvard, the method has been adopted by many of the larger and more important colleges. The progress made in all departments of study, especially the physical sciences and philosophy, has seemed to render this expansion of the curriculum necessary. The system of required studies still prevails, however, in most institutions.

Many of the well-endowed colleges have since 1872 offered courses of study for graduates, and have recognized the pursuit of these studies with the granting of degrees. The degree of Master of Arts (A. M.) and of Doctor of Philosophy (Ph. D.) are thus conferred, although the former is still granted by some colleges in course three years after graduation, and the latter is given also as an honorary title. Instruction is given both to graduates and undergraduates by text-books and lectures. Examinations, either oral or written, are held frequently; examinations in writing have been generally introduced since 1860. Examinations for a d ee were quite unknown before the first quarter of present century.

The promotion of learning was not the only motive which influenced the founders of the early colleges. The Puritan college was a religious institution. Learning was fostered, remarks the author of *New England's First Fruits* (London, 1643), because we dreaded "to leave an illiterate ministry to the churches when our present ministers shall lie in the dust." And for the half century that America had only one college it was conducted as a school of theology. Its primary purpose was to train men for the ministry. A similar reason occasioned the foundation of William and Mary College, in Virginia, by the Episcopalians, in 1693. Yale, whose charter bears date 1701, was established by ten ministers, and the ecclesiastical motive was prominent. A chief design in the organization of the College of New Jersey (1746) was "to supply the church with learned and able ministers of the word." Many of the colleges founded in the present century were started as religious institutions. One purpose of the planting of Amherst in 1825 was the training of foreign missionaries. The ecclesiastical motive has been influential in the formation of Western colleges Missionaries in the new States regard a college as essential instrument in their labor. Colleges in Ohio, Illinois, Iowa, Minnesota, and other States have been established with a design similar to that which ruled in the foundation of the early institutions. The State universities exhibit less of the ecclesiastical influence Being a part of the public system of education, they adhere, in common with all other public institutions, only to the general principles of Christianity. From a selected list of American colleges it is seen that 76 are non-sectarian, 49 belong to the Methodist Church, 37 each to the Baptist and Roman Catholic, 33 to the Presbyterian, 15 each to the Congregational and Lutheran, 11 to the Christian, 9 to the Episcopal, 7 to the United Brethren, 6 to the Reformed, 5 to the Friends, 4 to the Universalist, and 1 each to the Seventh Day Advent and the New Church. The relation between the colleges and the denomination of the church they represent varies. In the case of certain denominations, especially those whose government is hierarchical, the college is a part of the denominational machinery, and is therefore directly controlled by the church. In the case of other bodies, as the Baptist and Congregational, the relation is one of general superintendency. Although most of the instructors are members of that branch of the church which the college peculiarly represents, religious tests are seldom exacted of professors. The president of a prominent college says that although we demand no creed of professors, "we should no more think of appointing to a post of instruction here an irreligious than we should an immoral man, or one ignorant of the topic he would have to teach." In the case of many State universities, too, the large majority of the instructors are communicant members of the churches.

The part that religion occupies in the general life of a college also greatly varies. Religious societies of the students, holding devotional and literary meetings, exist in most institutions. A church is frequently connected with the college whose Sabbath services students are usually required to attend. Daily public prayers are customary, attendance on which is obligatory. The religious influence in many colleges is strong. More than one-half of all students are professing Christians, and the proportion of church members is much larger than at the opening of the century.

"Revivals" are not infrequent. Yale College in its history has experienced thirty-six, resulting in at least twelve hundred conversions; Dartmouth nine, with two hundred and fifty conversions; and Amherst and Middlebury at least twelve each, which have in the case of the former resulted in four hundred conversions.

Being institutions for literary and religious culture, the discipline required in colleges is usually, in comparison with the penalties of the civil law, of a mild order. The discipline, however, prevailing for at least a hundred years after the establishment of the first college was severe. Corporal punishment was inflicted till near the middle of the eighteenth century. Professors exercised authority over the details of their scholars' conduct. The manner of speech and of behavior was prescribed. The relation of the students to each other was indicated with precision. The social distinctions of the community were introduced into the college. Freshmen were, in accordance with the English university custom, "fags" for their superiors. The history of colleges is marked by a constant lessening of the restrictions governing students. Offences most commonly prevailing against college law are absence from lectures, failure to maintain a certain grade of scholarship, and insults to lower classmen usually embraced under "hazing." The penalties are of various degrees of severity, the extreme being expulsion. Offences committed by students against public law are also usually punished by the college. Offences of any sort, however, are no more common in the college than in the general community.

For their pecuniary support colleges depend on investments and tuition fees. In 1881 the value of the grounds, buildings, and apparatus of three hundred and sixty-two colleges reporting to the Commissioner of Education was $40,255,976. The amount of their productive funds was $43,786,877, and the income from these funds $2,618,008. The receipts from tuition aggregated $2,080,450. The property possessed by colleges is usually the result of the gift of individuals. Some institutions have received funds from the States in which they are located, and all the older colleges have been thus aided. The State universities are mainly supported from the public chest, and tuition is free to residents of the State. The endowments of the early colleges were small. In the seventeenth century Harvard received in donations of money less than $40,000, and the largest individual gift (excluding Harvard's) was only $5,000.

Up to the date of the Revolution William and Mary was the wealthiest institution in America. It was more an English than an American college, its chancellors being the bishops of London, and its presidents the representatives of those bishops in Virginia; and "the king, lords and commons," as well as the colony itself, were generous in their offerings. Indeed, throughout the period that America was a British province, its colleges were the recipients of British aid. The University of Pennsylvania, Columbia (King's College), Brown University and the College of New Jersey received large donations. Dartmouth College, or its predecessor, "Moor's Indian Charity School," received from England near the time of its foundation about $50,000. Scarcely a college established before the nineteenth century and now in successful operation failed to gain help from the mother-country. The reasons are plain. The colonists were poor. Englishmen were comparatively rich. The colleges were founded to promote learning, and the desire for its promotion in America was strong among English scholars. They were founded to educate ministers, and churchman and non-conformist were anxious that clergymen should be well trained in the new world.

The wealth of colleges was largely increased between 1850 and 1882. In 1847, when Abbott Lawrence gave $50,000 to Harvard, it was said to be "the largest amount ever given at any one time during the lifetime of the donor to any public institution in this country." Since 1860 the colleges have gained in wealth an amount more than equal to their entire valuation in that year. Over $50,000,000 have been bestowed on educational institutions in the United States, and more than $35,000,000 were donated between the years 1870 and 1880. In 1871 $8,435,990 were given for all educational purposes; in 1872, to universities and colleges, $6,282,461; in 1873, $8,238,141; in 1874, $1,845,354; in 1875, $2,703,650; in 1876, $2,743,248; in 1877, $1,273,991; in 1878, $1,389,633; in 1879, $3,878,648; in 1880, $2,666,571; and in 1881, $4,601,069. The separate contributions varied from a few dollars to millions.

Gifts are made either for general purposes or for the endowment of professorships, the foundation of scholarships, and in aid of libraries and museums. The income attached to a professorship varies in annual value from perhaps a thousand to eight thousand dollars. Twenty-five hundred dollars is an average. Scholarships assigned to undergraduates are designed either as a reward for proficiency in college studies or as a means of pecuniary support; most frequently they are purposed to effect both objects. They seldom exceed three hundred dollars in value a year, and are usually between one hundred and two hundred. Nearly all colleges also offer pecuniary assistance to students in need. Scholarships or fellowships for graduates are designed to support the student while pursuing studies under the patronage of the college. They are similar to the foundations of the English universities bearing the same name. A few of them permit residence in Europe. They are held at the pleasure of the institution granting them, but seldom for more than three years.

For their support the colleges derive, in addition to the income from invested property, about two million dollars yearly from the fees for tuition. These fees do not exceed two hundred dollars for each student, and on average fall perhaps between fifty and seventy-five. In all colleges the income of the tuition-fees fails to meet the expenses of instruction and administration. Endowment is essential to their existence.

Among the most munificent benefactors of American colleges are George Peabody, Johns Hopkins, of Baltimore, who endowed the university bearing his name with three millions; Mrs. Valeria G. Stone, of Massachusetts, who distributed more than a million of dollars among various institutions; Asa Packer, the founder of Lehigh University; Ezra Cornell, the founder of Cornell University; Ario Pardee, who endowed certain departments of Lafayette College; John C. Green, who gave liberally to Princeton College; and Joseph E. Sheffield, who [illegible] the scientific school of Yale College. La[illegible] tributions and bequests to colleges were [illegible] by Samuel Williston, of Amherst, [illegible] Vanderbilt, of New York, Henry W. T[illegible], of [illegible] delphia, Amasa Stone and H. W. [illegible] George I. Seney, of New York. Ni[illegible]

and Alexander Agassiz. Matthew Vassar, Smith, and Henry F. Durant each founded a for women, and Henry W. Sage made provision instruction of women in Cornell University. ithstanding the endeavors of such benefactors, lleges are compelled to struggle with inadequate ient. In comparison, also, with the University rd and that of Cambridge American colleges are he Report of the Parliamentary Commissioners, ed in 1874, the first comprehensive statement property of these ancient corporations, showed 1871 their entire income was £754,000. The f their property can hardly be estimated; a prin- em is 319,718 acres of land. Trinity College, dge, had in 1871 an income of £60,000, St. of £50,000, New of Oxford of £30,000, Merton 500, and All Souls' of £18,000. The English ies depend for their income mainly on prop- ue American colleges on both property and n about equal proportions.

laboratories are regarded as essential equipment of the college. The increase of er and size has kept pace with the increase number of volumes published and with the pro- f the natural sciences.

Harvard's bequest of his library of three hun- lumes is the foundation of the Harvard College —the largest of the class in the country—of ed thousand volumes and of two hundred phlets. In 1732 Dean Berkeley sent to a thousand volumes, which, in the opin- ent Clap, formed "the finest collection of hich had ever been brought to America at one The number of volumes in all the college in 1890 was 3,694,825. The increase in ten as 1,392,934. The libraries of students' societies o greatly augmented. The use of books on the students has within ten years greatly increased. e colleges professors specially reserve books for s. Independent investigation and study are omoted. Chemical laboratories, of greater or mpleteness, have been established since the of chemistry came to form a part of the cur- Physical laboratories are found in only a utions. It may be added that within the e of years many colleges have built and d gymnasiums, affording opportunity for physi-

ast women who received a college degree in ntry were three graduates of Oberlin College . The majority of the colleges established since that time have admitted both sexes on equal terms. Nearly two-thirds of all colleges now admit both men and women. Colleges for women only, although few in number, have been founded and well endowed, of which Vassar at Poughkeepsie, N. Y., chartered in 1861, and Smith at Northampton, Mass., organized in 1875, are prominent. Strenuous efforts are being made to open institutions to women originally designed for men.

Among those who have had great influence upon college education are Clap, president of Yale College, 1739–66; Dwight, president, 1795–1817; Kirkland, president of Harvard, 1810–28; Quincy, president, 1829–45; Nott, president of Union College, N. Y., for sixty-two years, 1804–66; Wayland, president of Brown University, 1827–55; and Stearns, president of Amherst, 1854–76.

The proportion of graduates to the whole population has slightly decreased. In 1889 there were 89,090 students in 384 colleges, taught by 5422 instructors. About one-sixth of these students were women. The number of graduates entering the different professions has greatly changed in the nearly two and a half centuries since the first college was founded. More than half of the graduates of the early colleges became clergymen. Of the same colleges hardly ten per cent. of graduates now choose the clerical profession. The legal profession is adopted by more graduates of the colleges of New England and the Middle States than any other. A large proportion of the graduates of the denominational institutions of the West, however, become ministers.

The age of admission to the college has constantly risen throughout the century. It is a rule in most institutions that no student shall be admitted to the freshman class under fourteen years, and to no other class without an additional increase of one year for each class. At Harvard College the average age of admission is now slightly more than eighteen and one-half years. Since 1856 it has risen nearly one year.

To form a correct list of American colleges has been often attempted. The difficulty lies in the constant changes of birth and dissolution affecting many institutions bearing the name. The following table, composed of selections from various tables in the last Report of the Commissioner of Education, presents a select list of colleges, with the most important facts concerning each. Colleges marked with an asterisk (*) are open to both sexes, those with a dagger (†) to women only, and the rest to men only.

Name.	Location.	Date of Charter.	Denomination.	Students.	Teachers.	Volumes in Library.	Value of Grounds, etc.	Income from Productive Funds.
rn University	Greensboro, Ala	1856	Meth. Epis. South	62	6	1,000	$50,000	
Hill College	Near Mobile, Ala	1836	Roman Catholic	111	28			
sity of Alabama*	Tuscaloosa, Ala	1820	Non-sectarian	158	16	7,000	250,000	$24,000
ns College*	Batesville, Ark	1872	Presbyterian	34	5	700	12,000	400
ns Industrial University*	Fayetteville, Ark	1871	Non-sectarian	161	17	800		
University*	Judsonia, Ark	1871	Baptist	64	5	460	50,000	
n's College of Arkansas*	Little Rock, Ark	1850	Non-sectarian	53	11	250	75,000	2,500
ary College of St. Augustine	Benicia, Cal	1868	Prot. Episcopal	45	5	650	40,000	
sity of California*	Berkeley, Cal	1868	Non-sectarian	189	38	15,624	695,000	102,688
Christian College*	College City, Cal	1871	Christian	77	6		10,000	
atus College	San Francisco, Cal	1859	Roman Catholic	62	24	10,000		
y's College	San Francisco, Cal	1872	Roman Catholic	119	25	1,000	250,000	
lara College	Santa Clara, Cal	1851	Roman Catholic	57	10	10,000	57,200	
sity of the Pacific*	Santa Clara, Cal	1851	Meth. Episcopal	68	12	2,000	75,000	3,000
[illegible]	Vacaville, Cal	1870	Baptist	59	4			
[illegible]	Washington, Cal	1871	Non-sectarian	79	6			
[illegible]	Woodland Cal	1869	Christian	73	5		20,000	2,500

	Location.	Date of Charter.	Denomination.	Students.	Teachers.	Volumes in Library.	Value of Grounds, etc.	Income from Productive Funds.
University of Colorado*	Boulder, Col.	1875	Non-sectarian	10	5	2,000	75,000	15,000
Colorado College*	Colorado Springs, Col.	1874	Congregational	39	8	200	30,000	
Trinity College	Hartford, Conn.	1824	Prot. Episcopal	101	8	18,275		
Wesleyan University*	Middletown, Conn.	1830	Meth. Episcopal	164	16	30,000	450,000	
Yale College	New Haven, Conn.	1701	Non-sectarian	695	30	93,000		77,580
Delaware College	Newark, Del.	1867	Non-sectarian	50	5	6,500	75,000	4,980
University of Georgia*	Athens, Ga.	1785	Non-sectarian	176	9	14,000	173,000	11,256
Atlanta University*	Atlanta, Ga.	1867	Non-sectarian	26	6	4,000	100,000	360
Bowdon College*	Bowdon, Ga.	1857	Non-sectarian	78	4	.....	8,000	
Gainesville College*	Gainesville, Ga.	1873	Non-sectarian	34	8	213	10,000	
Mercer University†	Macon, Ga.	1837	Baptist	107	6	6,000	150,000	7,000
Pio Nono College†	Macon, Ga.	1876	Roman Catholic	45	4	1,100	50,000	
Emory College	Oxford, Ga.	1836	Meth. Epis. South	136	8	3,500	100,000	
Abingdon College*	Abingdon, Ill.	1855	Christian	11	.....	300	40,000	600
Hedding College	Abingdon, Ill.	1873	Meth. Episcopal	56	12	3,000	75,000	
Illinois Wesleyan University*	Bloomington, Ill.	1850	Methodist	94	9	.....	100,000	1,800
St. Viateur's College	Bourbonnais Grove, Ill.	1874	Roman Catholic	53	12	2,500	60,000	800
Blackburn University*	Carlinville, Ill.	1857	Presbyterian	69	7	3,000	90,000	6,000
Carthage College*	Carthage, Ill.	1870	Lutheran	83	6	.....	40,000	2,200
St. Ignatius College	Chicago, Ill.	1870	Roman Catholic	38	7	12,000		
University of Chicago*	Chicago, Ill.	1859	Baptist	157	10	6,000	$255,000	900
Eureka College*	Eureka, Ill.	1855	Christian	96	6	1,000	50,000	1,500
Northwestern University*	Evanston, Ill.	1851	Methodist Episcopal	173	10	30,000	300,000	20,000
Ewing College*	Ewing, Ill.	1874	Baptist	32	6	25	10,000	100
Knox College*	Galesburg, Ill.	1837	Non-sectarian	92	15	4,000	121,900	10,000
Lombard University*	Galesburg, Ill.	1851	Universalist	23	5	3,835	40,000	8,000
Illinois College	Jacksonville, Ill.	1835	Non-sectarian	87	9	8,000	100,000	8,000
Lake Forest University*	Lake Forest, Ill.	1856	Presbyterian	63	8	4,000	150,000	14,000
McKendree College*	Lebanon, Ill.	1834	Methodist Episcopal	89	8	7,500	54,000	2,500
Lincoln University*	Lincoln, Ill.	1865	Cumberland Presb.	199	11	16,000	180,000	30,000
Evangelisch-Lutherisches Collegium	Mendota, Ill.	.....	Lutheran	17	4	300	2,400	
Monmouth College*	Monmouth, Ill.	1857	United Presbyterian	152	8	2,000	55,000	4,000
Mt. Morris College*	Mt. Morris, Ill.	.....	Brethren	205	7	28,000	40,000	
Northwestern College*	Naperville, Ill.	1865	Evangelical	72	6	.....	50,000	7,000
Augustana College	Rock Island, Ill.	1865	Evang. Lutheran	63	.....	6,460	50,800	
Shurtleff College*	Upper Alton, Ill.	1832	Baptist	58	8	5,000	40,000	6,000
Westfield College*	Westfield, Ill.	1865	United Brethren	12	5	2,500	45,000	2,000
Wheaton College*	Wheaton, Ill.	1861	Non-sectarian	44	12	2,500	84,250	3,370
Bedford College*	Bedford, Ind.	1872	Christian	15	5	250	15,000	
Indiana University*	Bloomington, Ind.	1828	Non-sectarian	162	10	7,250	100,000	8,000
Wabash College	Crawfordsville, Ind.	1834	Presbyterian	96	11	18,300	150,000	17,000
Concordia College	Fort Wayne, Ind.	1850	Evang. Lutheran	135	7	3,000	100,000	
Franklin College*	Franklin, Ind.	1844	Baptist	28	7	3,100	40,000	4,000
Indiana Asbury University*	Greencastle, Ind.	1837	Methodist Episcopal	185	14	10,000	200,000	12,000
Hanover College	Hanover, Ind.	1833	Presbyterian	57	7	5,000		
Hartsville University*	Hartsville, Ind.	1851	United Brethren	81	6	900	30,000	1,200
Butler University*	Irvington, Ind.	1850	Christian	82	12	2,000	150,000	12,000
Union Christian College*	Merom, Ind.	1859	Christian	24	8	725	50,000	4,800
Moore's Hill College*	Moore's Hill, Ind.	1856	Methodist Episcopal	47	6	500	30,000	1,200
Earlham College*	Richmond, Ind.	1859	Friends	41	5	2,370	76,000	4,200
Ridgeville College*	Ridgeville, Ind.	1867	Free-Will Baptist	14	5	.....	30,000	1,500
St. Meinrad's College	St. Meinrad, Ind.	1867	Roman Catholic	72	15	5,000	15,000	6,750
Amity College*	College Springs, Iowa.	1853	Non-sectarian	175	5	500	10,000	2,000
Griswold College	Davenport, Iowa.	1859	Protestant Episcopal	22	7	6,000	127,000	
Norwegian Lutheran College	Decorah, Iowa.	1866	Lutheran	88	8	3,200	100,000	
University of Des Moines*	Des Moines, Iowa.	1865	Baptist	13	4	2,000	.....	2,000
Parsons College*	Fairfield, Iowa.	1875	Presbyterian	37	8	1,000	27,000	2,500
Upper Iowa University*	Fayette, Iowa.	1860	Methodist Episcopal	30	7	1,500	35,000	600
Iowa College*	Grinnell, Iowa.	1847	Congregational	.....	.....	.....	78,900	7,788
Simpson Centenary College*	Indianola, Iowa.	1867	Methodist Episcopal	58	5	1,000	20,000	3,800
State University of Iowa*	Iowa City, Iowa.	1847	Non-sectarian	247	16	13,000	400,000	20,000
German College*	Mt. Pleasant, Iowa.	1873	Methodist Episcopal	17	5	300	17,000	1,500
Iowa Wesleyan University*	Mt. Pleasant, Iowa.	1855	Methodist	87	10	1,500	41,000	4,000
Cornell College*	Mt. Vernon, Iowa.	1857	Methodist Episcopal	91	9	4,600	100,000	4,000
Oskaloosa College*	Oskaloosa, Iowa.	1857	Christian	26	7	1,200	50,000	1,600
Penn College*	Oskaloosa, Iowa.	1873	Friends	36	5	1,500	33,000	600
Central University of Iowa*	Pella, Iowa.	1853	Baptist	42	11	2,000	40,000	
Whittier College	Salem, Iowa.	1867	Friends	21	.....	600		
Tabor College*	Tabor, Iowa.	1866	Congregational	73	8	4,000	20,000	2,500
Western College*	Western, Iowa.	1856	United Brethren	41	5	1,[illegible]	3,500	1,300
St. Benedict's College	Atchison, Iowa.	1868	Roman Catholic	25	7	3,[illegible]		
Baker University*	Baldwin City, Iowa.	1858	Methodist Episcopal	34	8	2,[illegible]		
Highland University*	Highland, Kan.	1858	Presbyterian	12	5	[illegible]		
University of Kansas*	Lawrence, Kan.	1863	Non-sectarian	197	14	[illegible]		7,000
Lane University*	Lecompton, Kan.	1862	United Brethren	26	4	[illegible]		1,000
St. Mary's College	St. Mary's, Kan.	1869	Roman Catholic	63	16	[illegible]		
Washburn College*	Topeka, Kan.	1865	Congregational	16	4	[illegible]		4,000
St. Joseph's College	Bardstown, Ky.	1824	Roman Catholic	84	17	[illegible]		
Berea College*	Berea, Ky.	1865	Non-sectarian	42	12	[illegible]		
Cecilian College	Cecilian, Ky.	1867	Roman Catholic	6	10	[illegible]		
Centre College	Danville, Ky.	1819	Presbyterian	92	6	[illegible]		5,000
Eminence College*	Eminence, Ky.	1856	Christian	83	10	[illegible]		
Kentucky Military Institute	Farmdale, Ky.	1845	Non-sectarian	163	7	[illegible]		
Georgetown College	Georgetown, Ky.	1829	Baptist	97	6	[illegible]		
Kentucky University	Lexington, Ky.	1858	.....	66	3	11,[illegible]		10,000
Kentucky Wesleyan College	Millersburg, Ky.	1860	Methodist	78	5	1,000	[illegible]	
Murray Male and Female Institute*	Murray, Ky.	1870	Non-sectarian	160	5	[illegible]		
Concord College*	New Liberty, Ky.	1868	Baptist	96	3	[illegible]		
Kentucky Classical and Business Coll.*	North Middletown, Ky.	1878	Christian	104	17	[illegible]		
Bethel College	Russellville, Ky.	1856	Baptist	90	[illegible]	[illegible]		3,000

	Location.	Date of Charter.	Denomination.	Students.	Teachers.	Volumes in Library.	Value of Grounds, etc.	Income from Productive Funds.
Louisiana State University and Agricultural and Mechanical College*	Baton Rouge, La.	{1853 1874}	Non-sectarian	122	4	14,000	$78,400	19,400
Jefferson College (St. Mary's)	Convent, La.	1861	Roman Catholic	65	15	30,000	100,000	
St. Charles College	Grand Coteau, La.	1852	Roman Catholic	15	3	5,000	30,000	
Centenary College of Louisiana	Jackson, La.	1825	Meth. Epis., South.	36	3	3,000	80,000	
New Orleans University*	New Orleans, La.	1873	Methodist Episcopal	23	4	500	7,000	
Straight University*	New Orleans, La.	1869	Congregational	16	7	300	23,000	
Bowdoin College	Brunswick, Me.	1794	Congregational	140	20	19,500	400,000	14,080
Bates College*	Lewiston, Me.	1854	Free-Will Baptist	143	7	5,537	150,000	7,500
Colby University*	Waterville, Me.	1820	Baptist	157	8	15,800	150,000	12,000
St. John's College	Annapolis, Md.	1784	Non-sectarian	63	9	5,000	65,000	
Baltimore City College	Baltimore, Md.	.....	Non-sectarian	579	13	.....	150,000	
Johns Hopkins University	Baltimore, Md.	1867	Non-sectarian	123	.....	7,084	....	180,000
Loyola College	Baltimore, Md.	1853	Roman Catholic	85	15	15,000	75,000	
Washington College	Chestertown, Md.	1782	Non-sectarian	41	3	1,400	40,500	1,734
Rock Hill College	Ellicott City, Md.	1865	Roman Catholic	44	18	4,000		
St. Charles College	Ellicott City, Md.	1831	Roman Catholic	109	14	5,000		
Frederick College	Frederick, Md.	1829	Non-sectarian	46	3	3,000	15,000	
Western Maryland College*	Westminster, Md.	1868	Methodist Protestant	71	12	4,000	35,000	
Amherst College	Amherst, Mass.	1825	Congregational	350	19	35,660	400,000	20,000
Boston College	Boston, Mass.	1863	Roman Catholic	238	14	12,000	400,000	
Boston University*	Boston, Mass.	1869	Methodist Episcopal	127	16	.....	.....	105,569‡
Harvard College	Cambridge, Mass.	1650	Non-sectarian	879	52	182500	1,020,362	
Tufts College	College Hill, Mass.	1852	Universalist	92	12	19,000	250,000	37,000
Williams College	Williamstown, Mass.	1793	Congregational	206	13	19,000	250,000	18,000
Wellesley College†	Wellesley, Mass.	.....	Non-sectarian	323	31	21,000		
College of the Holy Cross	Worcester, Mass.	1865	Roman Catholic	91				
Smith College†	Northampton, Mass.	1870	Non-sectarian	205	22	2,000	300,000	30,000
Adrian College*	Adrian, Mich.	1859	Methodist Protestant	95	10	400	137,000	6,000
Albion College*	Albion, Mich.	1860	Methodist Episcopal	140	11	2,500	50,000	12,200
University of Michigan*	Ann Arbor, Mich.	1836	Non-sectarian	521	35	29,000	$800,000	$38,000
Battle Creek College*	Battle Creek, Mich.	1874	Seventh-Day Advent.	150	11	1,000	80,000	
Hillsdale College*	Hillsdale, Mich.	1855	Free-Will Baptist	135	18	7,000	125,000	8,000
Hope College	Holland, Mich.	1866	Reformed	50	6	4,500	43,000	4,024
Kalamazoo College*	Kalamazoo, Mich.	1855	Baptist	34	8	3,300	100,000	3,790
Olivet College*	Olivet, Mich.	1859	Cong. and Presb.	83	12	7,000	111,700	7,732
St. John's College	Collegeville, Minn.	1857	Roman Catholic	76	20			
University of Minnesota*	Minneapolis, Minn.	1868	Non-sectarian	130	18	13,000	200,000	26,998
Carleton College*	Northfield, Minn.	1866	Congregational	52	11	4,024	79,952	7,022
Shaw University*	Holly Springs, Miss.	1870	Methodist Episcopal	20	6	600	10,000	
University of Mississippi*	Oxford, Miss.	1844	Non-sectarian	169	11	.....	300,000	32,643
Alcorn University*	Rodney, Miss.	1871	Non-sectarian	20	4	175	60,000	
Christian University*	Canton, Mo.	1853	Christian	98	9			
St. Vincent's College	Cape Girardeau, Mo.	1843	Roman Catholic	73	11	3,000	60,000	
University of the State of Missouri*	Columbia, Mo.	1839	Non-sectarian	514	31	11,925	.....	14,567
Central College*	Fayette, Mo.	1855	Meth. Epis. South	155	7	1,200	50,000	4,800
Lincoln College*	Glenwood, Mo.	1870	United Presbyterian	15	2	300	2,500	
La Grange College	La Grange, Mo.	1858	Baptist	96	8	1,500	20,000	
William Jewell College	Liberty, Mo.	1849	Baptist	90	7	3,500	75,000	5,000
College of the Christian Brothers	St. Louis, Mo.	1855	Roman Catholic	50	18	30,000	75,000	
St. Louis University	St. Louis, Mo.	1832	Roman Catholic	197	26	20,000		
Washington University*	St. Louis, Mo.	1853	Non-sectarian	73	15	6,000	500,000	30,000
Stewartsville College*	Stewartsville, Mo.	1879	Non-sectarian	45	4	150	500	30
Drury College*	Springfield, Mo.	1873	Congregational	91	10	5,000	50,000	
Central Wesleyan College*	Warrenton, Mo.	1865	Methodist Episcopal	62	6	2,700	35,000	2,000
Doane College*	Crete, Neb.	1872	Congregational	23	6	1,000	25,000	2,970
University of Nebraska*	Lincoln, Neb.	1869	Non-sectarian	90	10	2,700	150,000	
Dartmouth College	Hanover, N. H.	1769	Congregational	215	14	55,000	100,000	25,000
St. Benedict's College	Newark, N. J.	.....	Roman Catholic	49	5	900		
Rutgers College	New Brunswick, N. J.	1770	Non-sectarian	123	13	7,750	400,000	21,729
College of New Jersey	Princeton, N. J.	1748	Presbyterian	417	25	47,000	800,000	60,000
Seton Hall College	South Orange, N. J.	1861	Roman Catholic	53	10			
Alfred University*	Alfred, N. Y.	1857		86	16	.....	111,000	6,384
St. Bonaventure's College	Allegany, N. Y.	1875	Roman Catholic	90	10	5,500	192,000	
St. Stephen's College	Annandale, N. Y.	1860	Protestant Episcopal	52	6	2,500	150,000	
Wells College†	Aurora, N. Y.	1868	Presbyterian	18	9	2,000	265,000	7,000
Brooklyn Collegiate and Polytechnic Institute	Brooklyn, N. Y.	1854	Non-sectarian	154	12	2,122	144,856	646
St. John's College	Brooklyn, N. Y.	1873	Roman Catholic	129	10			
Canisius College	Buffalo, N. Y.	.....	Roman Catholic	154	14	12,000		
St. Joseph's College	Buffalo, N. Y.	.....	Roman Catholic	14	10	2,090	110,000	
St. Lawrence University*	Canton, N. Y.	1856	Universalist	44	7	8,537	37,500	5,309
Hamilton College	Clinton, N. Y.	1812	Presbyterian	162	13	12,000	320,000	18,000
Elmira Female College†	Elmira, N. Y.	1855	Presbyterian	72	.....	1,000	140,000	
St. John's College	Fordham, N. Y. (New York City)	1846	Roman Catholic	52	10	.....	375,000	
Hobart College	Geneva, N. Y.	1825	Protestant Episcopal	67	8	13,000	91,650	15,058
Madison University	Hamilton, N. Y.	1846	Baptist	88	10	11,000	150,000	29,340
Cornell University*	Ithaca, N. Y.	1865	Non-sectarian	167	42	36,712	665,952	77,182
College of St. Francis Xavier	New York, N. Y.	1861	Roman Catholic	128	8	16,000	228,000	
College of the City of New York	New York, N. Y.	1847	Non-sectarian	499	15	19,000	271,147	
Columbia College	New York, N. Y.	1754	Protestant Episcopal	279	18	19,613	860,000	240,000
Manhattan College	New York, N. Y.	1863	Roman Catholic	106	14	.....	173,000	
Rutgers Female College†	New York, N. Y.	1867	Non-sectarian	32	11			
St. Louis College	New York, N. Y.	.....	Roman Catholic	39				
University of the City of New York	New York, N. Y.	1830	Non-sectarian	144	63	3,501	328,000	12,350
Vassar College†	Poughkeepsie, N. Y.	1861	Non-sectarian	222	11	13,103	696,562	19,116
[illegible] of Rochester	Rochester, N. Y.	1850	Baptist	155	9	16,750	396,279	11,274
[illegible]	Schenectady, N. Y.	1795	Non-sectarian	231	31	24,000	430,000	34,054
[illegible]	Syracuse, N. Y.	1870	Methodist Episcopal	133	10	7,800	300,000	2,246
[illegible]	Chapel Hill, N. C.	1789	Non-sectarian	211	12	6,800	250,000	7,750

‡ Total receipts, exclusive of those of certain professional schools.

	Location.	Date of Charter.	Denomination.	Students.	Teachers.	Volumes in Library.	Value of Grounds, etc.	Income from Productive Funds
Biddle University	Charlotte, N. C.	1877	Presbyterian	25	4	2,500	18,000	600
Davidson College	Davidson College, N. C.	1837	Presbyterian	101	6	2,500	125,000	6,000
Rutherford College*	Happy Home, N. C.	1871	Non-sectarian	250	4	5,000	8,000	
North Carolina College	Mt. Pleasant, N. C.	1859	Evang. Lutheran	13	4	1,143	15,000	
Shaw University	Raleigh, N. C.	.....	Baptist	75	16	2,000		
Trinity College	Trinity College, N. C.	1851	Meth. Epis. South	114	6	2,000	40,000	
Wake Forest College	Wake Forest College, N. C.	1833	Baptist	117	7	7,000	50,000	3,000
Buchtel College*	Akron, Ohio	1870	Universalist	46	6	.....	175,000	2,400
Ashland College*	Ashland, Ohio	1878	Brethren	98	6	500	75,000	
Ohio University*	Athens, Ohio	1804	Non-sectarian	48	6	.....	130,000	4,292
Baldwin University*	Berea, Ohio	1846	Methodist Episcopal	125	10	1,500	25,000	2,500
German Wallace College*	Berea, Ohio	1864	Methodist Episcopal	60	6	500	107,000	4,000
St. Joseph's College	Cincinnati, Ohio	1873	Roman Catholic	155	9	1,000	40,000	
St. Xavier College	Cincinnati, Ohio	1831	Roman Catholic	58	15	12,000		
University of Cincinnati*	Cincinnati, Ohio	1870	Non-sectarian	104	10	146013		
Farmer's College*	College Hill, Ohio	1846	Non-sectarian	15	6	800	25,000	4,200
Capital University	Columbus, Ohio	1850	Evang. Lutheran	28	6	3,700	75,000	
Kenyon College	Gambier, Ohio	1824	Protestant Episcopal	43	8	22,000	.....	6,300
Denison University	Granville, Ohio	1832	Baptist	39	6	10,000	125,000	12,000
Ohio Wesleyan University*	Delaware, Ohio	1842	Methodist Episcopal	249	19	10,000	252,000	22,800
Rio Grande College*	Rio Grande, Ohio	1875	Free-Will Baptist	10	4	120	40,000	
Hiram College*	Hiram, Ohio	1867	Disciples	163	10	1,000	23,586	4,000
Western Reserve College*	Hudson, Ohio	1826	Presb. and Cong	68	8	11,000	100,000	16,000
Marietta College	Marietta, Ohio	1835	Non-sectarian	71	9	16,500	130,000	
Mt. Union College*	Mt. Union, Ohio	1858	Non-sectarian	278	19	.....	500,000	
Franklin College*	New Athens, Ohio	1825	Presbyterian	35	7	.....	10,000	
Muskingum College*	New Concord, Ohio	1837	United Presbyterian	89	8	500	16,000	500
Oberlin College*	Oberlin, Ohio	1833	Congregational	324	12	15,000	400,000	9,265
Miami Valley College*	Springboro', Ohio	1875	Friends	11	5	.....	75,000	
Wittenberg College*	Springfield, Ohio	1845	Evang. Lutheran	81	6	1,300	100,000	7,000
Heidelberg College*	Tiffin, Ohio	1851	Reformed	80	6	5,000	30,000	4,500
Urbana University	Urbana, Ohio	1851	New Church	8	4	5,000	41,500	4,000
Otterbien University*	Westerville, Ohio	1847	United Brethren	76	6	2,500	75,000	5,000
Wilberforce University*	Wilberforce, Ohio	1863	African Meth. Epis	4	7	4,000	.....	900
Wilmington College*	Wilmington, Ohio	1875	Friends	43	5	1,000	12,000	600
University of Wooster*	Wooster, Ohio	1866	Presbyterian	185	14	5,200	150,000	8,120
University of Oregon*	Eugene City, Oregon	1876	Non-sectarian	83	5	.....	80,000	4,000
Pacific University and Tualatin Academy*	Forest Grove, Oregon	1854	Evangelical	12	5	5,000	12,000	6,000
Christian College*	Monmouth, Oregon	1865	Christian	100	4	200	30,000	1,500
Philomath College*	Philomath, Oregon	1865	United Brethren	43	2	850	16,000	1,700
Willamette University*	Salem, Oregon	1853	Methodist Evang	14	.....	2,500	75,000	
Muhlenberg College	Allentown, Pa	1867	Evang. Lutheran	66	7	2,000	$75,000	
Lebanon Valley College*	Annville, Pa	1866	United Brethren	44	5	1,400		
St. Vincent's College	Beatty, Pa	1870	Roman Catholic	113	33	14,000	104,000	
Dickinson College	Carlisle, Pa	1783	Methodist Episcopal	66	7	7,974	350,000	12,000
Lafayette College	Easton, Pa	1826	Presbyterian	163	23	18,980	600,000	12,500
Pennsylvania College	Gettysburg, Pa	1832	Evang. Lutheran	87	8	8,000	100,000	6,000
Thiel College*	Greenville, Pa	1870	Evang. Lutheran	38	4	4,000		
Haverford College	Haverford College, Pa	1832	Friends	72	6	8,200	375,000	
Franklin and Marshall College	Lancaster, Pa	1853	Reformed	87	7	5,000	150,000	7,000
Lewisburg University	Lewisburg, Pa	1846	Baptist	44	7	8,000	100,000	6,000
Lincoln University	Lincoln Univ., Chester Co., Pa	1854	Non-sectarian	43	6	4,000	138,000	5,464
St. Francis College	Loretto, Pa	1858	Roman Catholic	53	12	.....	30,000	
Allegheny College*	Meadville, Pa	1817	Methodist Episcopal	110	8	10,000	300,000	10,500
Mercersburg College*	Mercersburg, Pa	1865	Reformed	32	7	600	50,000	500
Westminster College*	New Wilmington, Pa	1852	United Presbyterian	119	8	3,000	26,500	5,000
La Salle College	Philadelphia, Pa	1863	Roman Catholic	62	10	1,000	80,000	
University of Pennsylvania	Philadelphia, Pa	1755	Non-sectarian	135	33	20,000	500,000	20,580
Pittsburg Catholic College	Pittsburg, Pa	.....	Roman Catholic	100	7			
Western University of Pennsylvania	Pittsburg, Pa	1819	Non-sectarian	66	12	3,500	150,000	11,227
Lehigh University	South Bethlehem, Pa	1866	Protestant Episcopal	78	10	14,600	600,000	76,000
Swarthmore College*	Swarthmore, Pa	1864	Friends	118	9	3,521	600,000	4,800
Washington and Jefferson College	Washington, Pa	1802	Presbyterian	738	8	.....	125,000	11,000
Waynesburg College*	Waynesburg, Pa	1850	Cumberland Presb	117	6	900	30,000	
Brown University	Providence, R. I.	1764	Non-sectarian	271	17	52,000	.....	35,838
College of Charleston	Charleston, S. C.	1785	Non-sectarian	31	6	9,000	50,000	
Erskine College	Due West, S. C.	1841	Asso. Ref. Presb	53	5	1,500	40,000	4,600
Furman University	Greenville, S. C.	1850	Baptist	78	4	1,200	50,000	8,000
Newberry College	Newberry, S. C.	1856	Evang. Lutheran	45	7	5,000	25,000	500
Claflin University and South Carolina Agricultural College and Mechanics' Institute	Orangeburg, S. C.	1869 / 1872	Methodist Episcopal	14	5	1,200	40,000	
Wofford College	Spartanburg, S. C.	1851	Meth. Epis. South	66	8	5,000	.....	4,500
Adger College	Walhalla, S. C.	1877	Presbyterian	41	4	.....	5,000	2,100
East Tennessee Wesleyan University*	Athens, Tenn	1867	Methodist Episcopal	118	7	2,000	15,000	
Beech Grove College*	Beech Grove, Tenn	1869	Non-sectarian	20	5	125	6,000	
King College	Bristol, Tenn	1868	Presbyterian	29	4	.....	13,000	1,000
Southwestern Presbyterian University	Clarksville, Tenn	1875	Presbyterian	76	6	1,800	.....	6,000
Hiwassee College	Hiwassee College, Tenn	1850	Meth. Epis. South	218	8	.....	25,000	
Southwestern Baptist University	Jackson, Tenn	1874	Baptist	156	9	1,189	60,000	3,200
University of Tennessee and State Agricultural College	Knoxville, Tenn	1807 / 1869	Non-sectarian	125	14	4,460	100,000	24,210
Cumberland University	Lebanon, Tenn	1842	Cumberland Presb	40	5	8,000	50,000	
Bethel College*	McKenzie, Tenn	1850	Cumberland Presb	106	4	497	15,000	
Manchester College*	Manchester, Tenn	1856	Non-sectarian	27	2	.....	5,000	
Maryville College*	Maryville, Tenn	1842	Presbyterian	21	4	3,000	75,000	328
Christian Brothers' College	Memphis, Tenn	1872	Roman Catholic	62	10	2,500		
Carson College	Mossy Creek, Tenn	1853	Baptist	40	5	.....	15,000	
Central Tennessee College*	Nashville, Tenn	1866	Methodist Episcopal	10	9	1,800	95,000	250

	Location.	Date of Charter.	Denomination.	Students.	Teachers.	Volumes in Library.	Value of Grounds, etc.	Income from Productive Funds.
Fisk University*	Nashville, Tenn.	1867	Congregational	28	6	1,850	175,000	90
Vanderbilt University	Nashville, Tenn.	1872	Meth. Epis. South	191	15	8,000	500,000	42,000
University of the South	Sewanee, Tenn.	1858	Protestant Episcopal	114	8	6,500	67,500	1,657
Greeneville and Tusculum College*	Tusculum, Tenn.	1794	Non-sectarian	35	4	6,400	10,000	30
Southwestern University	Georgetown, Tex.	1875	Meth. Epis. South	74	7	1,200	35,000	
Baylor University	Independence, Tex.	1845	Baptist	77	8	1,500	70,000	600
Mansfield Male and Female College*	Mansfield, Tex.	1872	Non-sectarian	78	4	1,000	25,000	
Solado College*	Solado, Tex.	1869	Non-sectarian	22	3	75	16,000	
Austin College	Sherman, Tex.	1849	Presbyterian	12	4	5,000	25,000	1,200
Trinity University*	Tehuacana, Tex.	1870	Cumberland Presb.	65	6	1,200	75,000	600
Waco University*	Waco, Tex.	1861	Baptist	300	11	3,000	50,000	
Marvin College*	Waxahachie, Tex.	1873	Meth. Epis. South	98	4	.....	22,000	
University of Vermont*	Burlington, Vt.	1791	Non-sectarian	65	9	18,191	243,000	14,366
Middlebury College	Middlebury, Vt.	1800	Congregational	55	7	12,000	125,000	10,323
Randolph-Macon College	Ashland, Va.	1830	Meth. Epis. South	125	9	2,000	35,000	1,182
Emory and Henry College	Emory, Va.	1839	Meth. Epis. South	80	.....	4,800	100,000	
Hampden-Sidney College	Hampden Sidney, Va.	1783	Presbyterian	64	5	.....	50,000	4,800
Washington and Lee University	Lexington, Va.	1782	Non-sectarian	.....	9	15,000	150,000	10,000
College of William and Mary	Williamsburg, Va.	1693	Non-sectarian	28	1	5,000	75,000	2,000
Roanoke College	Salem, Va.	1853	Lutheran	65	7	16,000	75,000	
University of Virginia	University of Virginia, Va.	1819	Non-sectarian	328	.....	40,000	800,000	
Bethany College	Bethany, W. Va.	1840	Christian	94	6	.....	130,000	2,000
West Virginia University*	Morgantown, W. Va.	1867	Non-sectarian	57	.....	6,000	175,000	6,500
Shepherd College*	Shepherdstown, W. Va.	1871	Non-sectarian	93	3	155	45,000	
Lawrence University*	Appleton, Wis.	1847	Methodist Episcopal	96	9	6,570	65,000	3,200
Beloit College	Beloit, Wis.	1846	Presb. and Cong.	64	8	9,338	85,000	10,000
Galesville University*	Galesville, Wis.	1854	Methodist Episcopal	158	9	4,000	20,000	1,200
University of Wisconsin*	Madison, Wis.	1848	Non-sectarian	209	37	10,000	340,000	20,306
Milton College*	Milton, Wis.	1867	Seventh-Day Baptist	37	5	1,000	30,000	500
Racine College	Racine, Wis.	1852	Protestant Episcopal	44	6	7,000	100,000	
Ripon College*	Ripon, Wis.	1850	Congregational	55	11	5,000	150,000	6,000
Northwestern University	Watertown, Wis.	1864	Lutheran	38	6	1,500	50,000	
Georgetown College	Georgetown, D. C.	1815	Roman Catholic	54	12	30,000	325,000	
Columbian University	Washington, D. C.	1821	Non-sectarian	47	10	7,000	250,000	
Howard University*	Washington, D. C.	1867	Non-sectarian	15	4	7,000	500,000	2,675
University of Washington Territory*	Seattle, Wash. Ter.	1861	Non-sectarian	41	.....	300	100,000	700

Canada.—To the foregoing exhibit of the colleges of the United States we add the following statistics of the Universities and Colleges of Canada as given in the census of 1881. In Prince Edward Island there were 3 colleges with 58 inmates; in Nova Scotia, 10 with 79; in New Brunswick, 4 with 289; in Quebec, 32 with 1142; in Ontario, 31 with 1594; in Manitoba, 1 with 10; in British Columbia, 2 with 7; and in the Territories, 1 with 10; making a total of 85 colleges, with 5943 inmates. The most prominent institutions are the University of Toronto, which possesses buildings admirable for architectural effect; McGill College, in Montreal, among whose schools that of medicine is deservedly celebrated; Dalhousie University, in Halifax, which has also a medical school; and Laval University, a Roman Catholic institution in Quebec, with several affiliated colleges in other places.

No general history of the colleges of the United States has been written, though one is now contemplated. Among the works which serve as the material for this work are the histories of the individual colleges, Richardson's and Clark's *College Book*, Barnard's *Journal of Education*, and Thwing's *American Colleges: their Students and Work*. (C. F. T.)

COLLEGE POINT, a village of Queens co., N. Y., on the N. shore of Long Island, 2 miles N. of Flushing. It is on a branch of the Long Island Railroad, and has steamboat communication with New York, which is 10 miles distant by rail. College Point has a newspaper, good public and private schools, manufactures of rubber goods and of ribbons, and a population (mostly German) of 4192. St. Paul's College, to which it owes its name, was established by Rev. W. A. Muhlenberg, D. D., in 1838, but has been closed for some years.

COLLETT, JACOBINE CAMILLA, a Norwegian novelist, born Jan. 23, 1813, in Christiansand, where her father was a priest. She is a sister of the poet Henrik Wergeland. In 1832 she accompanied her father to Paris, and afterwards spent a year in Hamburg, where she studied German literature. In 1841 she was married to Peter Jonas Collett (1813–1851), professor of jurisprudence in the University of Christiana, and distinguished both as jurist and poet. Since the death of her husband, Madame Collett has spent the most of her time in other countries, and she now lives in Paris. Her first novel, *Amtmandens Döttre* (1855, 3d ed. 1877), was published anonymously. It is a powerful portrayal of the wrongs of woman. The author continued to plead the cause of her sex in other novels of considerable merit, the chief of which are: *Fortœllinger* (1861); *I de langer Nœtter* (1863); *Sidste Blade* (3 vols., 1868–72); *Erindringer og Bekjendelser* (1874); *Fra de Stummes Leir* (1877); *Et Lyst Billede den mörk Ramme* (1878); and *Most Strömmen* (1880). Many useful reforms in the education of girls and in other social problems in Norway may be traced to Madame Collett's influence.

COLLIER, JOHN PAYNE (1789–1883), an English literary historian and Shakespearian critic, was born in London, Jan. 11, 1789. His father had been a merchant, but afterwards became editor of the *Monthly Register* and a contributor to the *Times*. Young Collier studied law in the Middle Temple, and after his admission to the bar in 1809 was a parliamentary reporter. His marriage in 1816 having provided him with a moderate fortune, he devoted his leisure to the study of the old English poets, and published the *Poetical Decameron, or Ten Conversations on English Poets* (2 vols., 1820). This was followed by an allegorical poem in Spenserian verse, called *The Poet's Pilgrimage* (1822). Then he edited and enlarged *Dodsley's Old Plays* (3 vols., 1825–27). His valuable *History of Dramatic Poetry* (3 vols., 1831, new ed., 1879), a series of dissertations on the English stage, gave him a prominent place as a literary historian. The Duke of Devonshire and Lord Francis Gower gave Mr. Collier the use of their valuable libraries, and from

these sources he published *New Facts Regarding the Life of Shakespeare* (1835); then *New Particulars Regarding the Works of Shakespeare* (1836), and *Farther Particulars* (1839). After twenty years spent in such literary investigations, Mr. Collier issued his edition of *Shakespeare* (8 vols., 1842–44), but his emendations, derived, as he alleged, strictly from antiquarian sources, did not win the assent of the best critics. In 1847 Mr. Collier was made secretary of the royal commission for the reorganization of the British Museum. His services to literature were acknowledged by an annual pension of £100. Among his publications of this period were *Memoirs of the Principal Actors in the Plays of Shakespeare* (1846), *Book of Roxburgh Ballads* (1847). Great sensation was produced in the literary world by his publication in 1852 of *Notes and Emendations to Shakespeare's Plays*, which were based on manuscript marginal notes in a copy of the second folio edition of Shakespeare. English, German, and American critics fiercely attacked first the value, and finally the authenticity of these notes, and it is now settled that Mr. Collier largely retouched and added to them, if, indeed, any were of earlier origin. The investigation tended also to throw suspicion and discredit on all the previous discoveries announced by him., and his *Reply* (1860) was not satisfactory. He afterwards published a *Bibliographical Account of Rare Books* (1865); *Illustrations of Old English Literature* (1866), and a series of reprints of the minor poets and prose writers of the sixteenth century. He died at London, September, 1883.

COLLINGWOOD, a town of Canada, in Simcoe co., Ontario, at the S. end of Nottawasago Bay, an inlet of Georgian Bay (Lake Huron), 95 miles by rail N.N.W. of Toronto. It is on the Northern Railway, at the junction of the Northwestern and North Simcoe railways. It is built on low ground, but its situation gives it great advantages for lake commerce. It has a town hall, a collegiate institute, 2 banks, 7 churches, 2 weekly newspapers, 5 steam saw-mills, 3 planing-mills, a foundry, a machine-shop, manufactures of farm-implements, flour, leather, steam-boilers, soap, stoves, furniture, brooms, and other goods, several pork-packing establishments, 2 elevators, and a dry-dock. The harbor is protected by a breakwater, and has a light-house. The property valuation is $1,100,000; town debt, $80,000; yearly expenses about $26,000. Collingwood was settled in 1831, and incorporated in 1858. Population, 4445.

COLLINS, William Wilkie, an English novelist, born in London, Jan., 1824. He was the son of William Collins, R. A., an eminent painter of landscape and rural scenes. His mother was also possessed of talent in art. He received his education at a private school, after which he spent two years in Italy. He was then articled for four years to a firm engaged in the tea-trade. But he left that business to enter Lincoln's Inn, where he was a student of the law when his father died. In 1848 he published *Memoirs of the Life of William Collins* (his father), with selections from his journals and letters, 2 vols., giving very interesting information on the character and condition of English art. Of this work the *London Examiner* said: "The son describes a picture as happily as the father painted it." His first novel (1850) was *Antonina; or, The Fall of Rome, a Romance of the Fifth Century*; it is a narrative of the capture of Rome by Alaric. In 1851 appeared *Rambles Beyond Railways;* in 1852, *Basil;* in 1853, *Mr. Wray's Cash-box;* in 1854, *Hide and Seek. After Dark* (1856) and *The Dead Secret* (1858) were first contributed serially to *Household Words*. In 1859 he issued *The Queen of Hearts;* in 1860, *The Woman in White;* and in 1862, *No Name*. The two last appeared serially in *All the Year Round*. *My Miscellanies* appeared in 1863; *Armadale* in 1866; *The Moon-Stone* in 1868; *Man and Wife* in 1870; *Poor Miss Finch* in 1872; *Miss or Mrs.? and Other Stories* in 1873, and in the same year *The New Magdalen; The Law and the Lady* in 1875; *Two Destinies* in 1876. Later, in the order mentioned, down to 1882, he has published *The Haunted Hotel, The Fallen Leaves, Jezebel's Daughter*, and *The Black Robe*. He visited the United States in 1873–74, and has expressed himself highly gratified by "the generous reception accorded him by his readers there." He has written a few original plays. One, called *The Lighthouse*, was played in 1855 by Charles Dickens and an amateur company at Tavistock House, Dickens's residence, for the benefit of the Guild of Literature and Art. *The Frozen Deep* had a similar representation in 1857. *Black and White*, in which he had the aid of Fechter, appeared at the Adelphi in the year 1869. Quite a number of his novels were dramatized by himself, and have been played with great success in England and America. Among these are *The Woman in White, Man and Wife, Armadale* (under the name of *Miss Gwilt*), *The Moonstone, The New Magdalen* (translated and performed also in Italy and Germany and France). Among his latest novels were *Heart and Science* (1883); *I Say No* (1884); *The Evil Genius* (1886); *The Legacy of Cain* (1888); and *Blind Love* (1889). He died in London, Sept. 23, 1889.

He was the acknowledged master of mystery, and in his best novels most skilfully reserved the secret of his story to the end. His intimate relations with Dickens should be noted. A long friendship between them was further cemented by the marriage of his brother to Dickens's daughter Kate in 1860. (H. C.)

COLLINSIA, a genus of North American annual herbs, belonging to the order *Scrophulariaceæ*, and interesting as affording several ornamental species for garden culture. Nuttall gave the name to this genus. Among noteworthy species are *C. bicolor* and *multicolor* of California; *C. grandiflora* and *parviflora*, both of Oregon, the latter ranging far eastward; and *C. verna* of the Ohio Valley. The genus was named in honor of Zaccheus Collins of Philadelphia, a meritorious botanist.

COLLINSON, Peter (1693–1768), an English botanist, was born at Hugal Hall, near Windermere, Westmoreland, Jan. 14, 1693. A member of the Society of Friends, he took a great interest in the colony of Pennsylvania, and was a benefactor of the Philadelphia Library. He was a correspondent of Franklin and Cadwallader Colden, and assisted the former in his earlier experiments in electricity. He caused large collections of American and other foreign trees and shrubs to be planted in Europe, and sent to America in return many European species. Linnæus named for him the genus *Collinsonia*, embracing certain labiate herbs, popularly known as stone-root, richweed, horse-balm, etc. He published various scientific and antiquarian papers. He died Aug. 11, 1768. Collinson was a friend of Linnæus, Sir Hans Sloane, and nearly all the eminent naturalists of his time.

COLLINSVILLE, a city of Madison co., Ill., is on high rolling land, 10 miles E. of St. Louis. The St. Louis, Vandalia, and Terre Haute Railroad passes

through the town. There are 4 hotels, 2 weekly newspapers, 7 churches, 4 schools 2 flour-mills, 2 factories manufacturing small bells. In the vicinity are 2 zinc factories and 11 coal mines, which send daily to St. Louis about 37,000 bushels of bituminous coal. Collinsville was settled in 1816, incorporated as a town in 1850, and as a city in 1870. Pop. 3498.

COLLISION, IN MARITIME LAW (Latin *con*, together, and *lædo*, to strike so as to injure), takes place when one vessel strikes another, or causes another vessel or thing to strike her, or causes her to strike another vessel or thing. The simplest form is direct contact; but there are many cases, especially in inland navigation, of what may be called constructive collision: as where one vessel by careless navigation puts another into such a position that to avoid a greater danger she runs into a wharf, or river-wall, or another vessel, or as where a steamer passes so close to flat-boats, or to a tug and tow, that her swell causes them to injure each other.

There were from the earliest times certain rules of the road understood by all navigators, but it was not until after the introduction of steam-vessels that they were formulated in law with a view to the prevention of collision. In 1838 Congress required all steam-vessels to "carry one or more signal lights" between sunset and sunrise. In 1846, and 1851, and 1852 the English Parliament passed very brief acts regulating the rule of the road, which were all repealed by the Merchant Shipping Act of 1862, empowering Her Majesty to make regulations to prevent collisions. The first series was made by an order in Council, Jan. 9, 1863, and has been adopted by all the maritime nations of the world, either expressly or by making identical regulations a part of their municipal law, as in the case of the United States by an act of Congress, April 29, 1864. The regulations of 1863 were repealed by an order of Council of Aug. 14, 1879, and others substituted to go into effect on and after Sept. 1, 1880, which are said by the order to apply to vessels of the United States whether within British jurisdiction or not. Inland navigation is subject to additional special local regulations, which generally depart no further than necessity requires from the rules of navigation at sea.

The danger of collision being caused by fog, darkness, or interfering courses, the object of the regulations is to show, in darkness and fog, whether a vessel is a steam or sailing vessel, whether she is at rest or under way, and if under way what her course is, and to determine both by day and night which vessel has the right to hold and which the duty to alter her course. These objects are accomplished in the following very simple way:

Every vessel at anchor is required to carry a globular lantern, throwing a white light all around the horizon, and fixed where it can best be seen, but not over twenty feet above the hull, and visible for at least one mile. This is called an anchor or riding-light. Every vessel under way is required to carry a red light on her port and a green light on her starboard side, so screened as to throw the light from right ahead to two points abaft the beam, and visible at least two miles. A steam-vessel must carry in addition a bright white light at her foremast head, so fixed as to throw an arc of light ahead and around each side to two points abaft the beam, and visible at least five miles. These are called the running-lights. Sailing-vessels are required to exhibit a torch or flare-up light to approaching steam-vessels; their side-lights in many cases not being visible to the latter, especially when overtaking. A steam-vessel towing another is required to show an additional white light not less than three feet above her mast-head-light. Pilot-boats are not allowed to carry the side-lights, but are required to carry a white light at the mast, visible all around the horizon, and to display a flare-up light every fifteen minutes. In fog, whether by day or night, vessels at anchor are required to ring bells at intervals of five minutes by the rules of 1863, and two minutes by those of 1880. And when under way a steam-ship is required to blow her whistle and a sailing-ship her fog-horn at the same intervals.

The steering and sailing-rules are too technical to be profitably discussed in this article. Some of the leading features are that an overtaking is bound to keep out of the way of the overtaken vessel; that a steam-vessel is in all cases bound to keep out of the way of a sailing-vessel; that of two sailing-vessels the one running free with the wind shall keep out of the way of the other; that of steam-vessels the one which has the other on the starboard side is bound to keep out of the way; and, finally, the Golden Rule (altered by the rules of 1880 in case of sailing-vessels), that in case of two vessels meeting end-on, or nearly end-on, the helms of each shall be put to port so that each shall go to the right. Wherever, by these rules, one vessel is to keep out of the way it is the duty of the other vessel to hold her course, and she will be held guilty of negligence for not doing so. Special circumstances will justify a departure from these rules to avoid immediate danger. Approaching steam-vessels indicate to each other by a single toot of their whistles that they are going to starboard, and by two toots that they are going to port. Every steam-vessel when approaching another vessel so as to involve a risk of collision shall slacken her speed, or, if necessary, stop and reverse, and when in a fog go at a moderate speed.

Liability for the damage caused by a collision depends upon negligence, and the burden of proving it lies upon the party complaining. Any departure from the foregoing regulations which contributes to the result will make the party at fault liable, and outside of them any lack of ordinary care, diligence, and good seamanship in the equipment and manning of the vessel, the sufficiency of the look-out, or in regulating her speed and manœuvres according to circumstances, will have the same effect. But there is this great difference between the courts of common law and of admiralty, that in the former the plaintiff cannot recover if he has been guilty of any contributory negligence whatever, while in the latter his own negligence will not defeat his right to recover, unless it was such as to cause or excuse the negligence of the other party, *i. e.*, such that the other party, by the exercise of ordinary care, could have avoided the consequences of it. If a vessel thrown by another into a position of peril fails to make a proper, or actually makes an improper, movement, it will be treated as an error and not charged to her as a fault. Allowance will be made for the excitement caused by the emergency. Where both vessels are in fault the damage is divided. In cases of inevitable accident, *i. e.*, where the collision could not have been prevented by the exercise of ordinary care and maritime skill, the loss lies where it has fallen. Such are cases of *vis major*, collision in a dense fog, great storm, or caused by the machinery or fasts suddenly giving way on account of a latent and undiscoverable defect.

In the admiralty courts vessels are personified and

made themselves liable for the contracts and the torts of the master committed within the scope of his employment. In ports and places where the owners do not reside and are not even known, the ordinary personal actions would be very insufficient remedies. Hence any one injured either in his person or property by a collision may sue the owners of the offending vessel, or the charterers, if she were demised so as to make them owners *pro hac vice*, on the ground that they are responsible for her master's acts as their servant, or he may proceed directly against the vessel herself, have her arrested and detained until the case is decided, unless the owners release her by giving security to pay any decree that may be rendered against her. There is a universal exception to the liability of being arrested in favor of the public vessels of every nation. If a decree is rendered against the vessel, the court condemns her to be sold to pay it. This latter course is called proceeding *in rem*, and is the course invariably taken when the offending vessel is not sunk and is within the jurisdiction. It differs from the ordinary personal action, not merely in the form of the remedy, but also in that it asserts a right of property in the offending vessel to the extent of the injury sustained. The vessel is, and continues, subject to the lien of this claim wherever she goes. Where a collision occurs while the vessel at fault is in charge of a pilot whom she is compelled by law to employ, neither the vessel nor the owners are held liable in England, the pilot not being their servant; whereas this is held to make no difference in the United States.

By the general maritime law of the continent of Europe owners were only held personally liable for injury done by their vessel up to the extent of their interest in her and her freight, so that if she were lost by a collision caused by her negligence their liability was at an end, and they could at any time put an end to it by abandoning the vessel and freight to the party complaining. But by the common law the liability of vessel-owners for the acts of their servants within the scope of their employment was, as in other cases, unlimited, and statutes have been passed in England and in the United States limiting it; in the former to an arbitrary sum per ton in all cases, and in the latter to the value of their interest in the ship and freight at the time of collision, to be determined in each case.

The injured party is entitled to recover such a sum of money as is necessary to a *restitutio in integrum*, and if the result of the repairs is to make his vessel more valuable he is entitled to the benefit of it. There is no deduction for new material in favor of the wrong-doer, as there is in insurance cases, of one-third off in favor of underwriters. He is entitled, beside repairs, to recover the expenses of towage, protests, surveys, and port charges made necessary by the collision, together with an allowance for profits lost during the detention. The latter is now usually calculated in England at an arbitrary sum of 4*d*. per registered ton in case of sailing-vessels; but in case of steam-vessels, and in both cases in the United States, the loss is made a subject of reference and proof. If the injured vessel is a total loss, the owner recovers her market value at the time of the collision, including an allowance for freight. If she is sunk, he is required to use ordinary prudence about raising her. It is generally his duty to raise her if it can be done, and he is entitled to recover the expense of doing so even if it prove greater than her value. But it would generally be unjustifiable to raise a vessel sunk in deep water, because a vessel should be treated as a total loss which it will cost more than her value to raise. When both vessels are found to be in fault, a decree is entered for half damages; *i. e.*, each pays one-half the damage sustained by the other, including damage to cargo, although of course the cargo-owners can recover their loss from either. This is done by each paying half the other's damage, and not, as the rule is frequently stated, by adding the damage and dividing the total, which would result in each paying the other the same sum, *i. e.*, nothing.

As admiralty courts entertain jurisdiction of collisions without reference to the place where they occur or to the nationality of the vessels, questions often arise as to the law which is to regulate the rights of the parties, though much less frequently since all maritime nations have agreed upon the same rules of navigation. The law of the place of collision controls, whatever be the nationality of the vessels, although the courts of the forum have refused to enforce foreign laws against their own vessels. When the place of collision is the high seas and the vessels are of different nationalities, difficult questions sometimes arise which it is not practicable to discuss here. (H. G. W.)

COLLUSION (Lat. *collusio*, from *colludere*, to play together), a deceitful agreement or compact between two or more persons for the purpose of obtaining some unlawful object or bringing about some unlawful result; in particular, an agreement between two or more persons to defraud another by means of the forms of law, or to bring about an unlawful result by lawful means. It is nearly synonymous with the old law-term "covin," and also with the ordinary sense of the word "conspiracy"—with this difference, however, that the latter always implies a more extensive and important act. Every collusion is a conspiracy, but every conspiracy is not a collusion.

Collusion plays an important part as a plea in bar of divorce (see DIVORCE) as when the parties agree that one of them shall commit some unlawful act which may afford the other a ground on which to base an action for divorce. The proof of the collusion invariably bars the divorce. In general, collusion, as a species of fraud, vitiates every act infected by it and renders it void.

COLLYER, ROBERT, an American Unitarian minister and author, was born at Keighley, Yorkshire, England, Dec. 8, 1823. His father was a blacksmith. The son left school at the early age of eight to work in the factory, and when fourteen went to Ilkley to learn the smith's craft. In 1850 he emigrated to America, and got work at hammer-making in Shoemakertown, Pa. From 1849 to 1859 he was a Methodist local preacher, but finding his views of doctrine changed, he left that body, and was invited to Chicago to take charge of a Unitarian mission among the poor. He became first pastor of Unity Church in Chicago, and remained there till Sept., 1879, when he removed to New York, having accepted a call to the Church of the Messiah, of which he still has charge. He has written a biography of Rev. A. H. Conant, a pioneer preacher and army chaplain, under the title *A Man in Earnest* (1868), and has published volumes of sermons under the titles *Nature and Life* (1867), *The Life that Now is* (1871), and *The Simple Truth* (1880), also *A History of the Town and Parish of Ilkley* (1886), in collaboration with Horsfall Turner, and *Lectures to Young Men and Women* (1886).

COLOCYNTH, or Bitter Cucumber (*Citrullus Colocynthis*), is a native of the warmer portions of Asia, but now is quite commonly found in Northern Africa and Southern Europe. The plant is a representative of the gourd family. Its chief claim to notice is, that it forms a drug of some commercial importance. In proper doses it is a vigorous cathartic, or if given in excessive doses it becomes an emetic and irritant. The portion of the fruit used is the bitter pulp, which, when deprived of the yellow, useless rind, appears as a white or yellowish-white ball from two to four inches in diameter, which is light, spongy, and easily separable into three parts. Only the pulp without the seeds is used, though some allege that the seeds, free from the pulp, may be used as a food. The constituents of colocynth are resin, pectin, gum, colocynthin, and 11 per cent. ash. Colocynthin ($C_{56}H_{84}O_{23}$) is a yellow substance, soluble in water and in alcohol, and exceedingly bitter.

COLOMBIA, The Republic of. This South American country, then bearing the name "United States of Columbia," had under successive Liberal administrations been at peace externally and internally, except for a few local seditions, until the election of Aquileo Para to the presidency in 1876. But then Recaredo de Villa, governor of Antioquia, declared war against the federal government. The Conservatives rose in Antioquia, Cauca, and Tolima, but the revolutionists were defeated at the battle of Los Chancos, near Buga, in Cauca, July 14, 1876; Antioquia was crushed, and the Liberal party became more than ever dominant. Gen. Julian Trujillo, who had commanded the principal federal army during the revolution, was elected president for the term 1878–80. He was succeeded by Dr. Rafael Nuñez, 1880–82, and in April, 1882, Dr. Francisco Xavier Zaldúa became president as the choice of the radical wing of the Liberal party. Dr. Zaldúa died Dec. 21, 1882, and was succeeded by the second vice-president, José E. Otólora. In 1884–85 a formidable and successful revolution occurred which changed not only the government, but the constitution of the country. The federal organization was given up, the former self-governed states reduced to subordinate provinces, and the political name of the country changed to the "Republic of Columbia," a new constitution being adopted in 1886. The provinces, however, still manage their own finances. The term of the president is extended to six years. Capital punishment is again established, and the members of the supreme court of justice are made immovable. The president is Dr. Rafael Nuñez, elected Aug. 7, 1886. The De Lesseps ship-canal, begun in Panama in 1881, was abandoned in 1889, after $240,000,000 had been spent, and 48,400,000 cubic metres of rock and earth excavated.

See Vol. VI. p. 137 Am. ed. (p. 152 Edin. ed.).

The greater part of the gold of Columbia is obtained from alluvial deposits, but a few quartz-mines are worked, chiefly in Antioquia, the principal mining district. In 1889 the gold mines of the Isthmus again attracted attention, and the government ceded several mines to natives and foreigners. The silver mines were formerly very productive; of late years, however, the production has fallen off. Platinum is mined only in small quantities, although, owing to the increased demand for that metal, greater attention is now given to this branch of mining. Iron-smelting-works have been established at Pacho in the savanna of Bogotá, and at Amagá in Antioquia; the product is not very great nor the iron of very good quality. A little copper-ore is mined in the State of Santander. No other metals are mined. Reports of the emeralds of Muzo first incited the Spaniards to the conquest of Bogotá. These are still the only pure emeralds known to commerce. There are several mines situated in the district of Muzo, in Boyacá, within an area of ten square miles, and at Somondoco, near Tunja, are mines of less importance which have not been worked since the colonial period. The emeralds occur in bands of fluor-spar, but more commonly in "nests," found in beds of quartz resting on deposits of pyrites. Many of these gems are found imprisoned in crystals of quartz. In 1787 the Spanish government ceased to work these mines. Shortly after the establishment of the republic they were leased to a native of Bogotá named Paris, who took a fortune from them. Later a French company obtained possession of them at an annual rental of $16,000. What gain, if any, accrued to the company has never been known, for every stone found was disposed of in Europe. By a law of May 31, 1876, the monopoly of the mines came to an end. Indications of emeralds have been noted near Cali, in Cauca, and at the mountain of Patiburú, in Antioquia. The working of the mines of rock-salt is monopolized by the federal Government; the prevalence of goitre in the region where this salt is used is supposed to be owing to the want of iodine in the salt. The State of Cauca imports salt from Payta, in Peru; the States of the Caribbean seaboard are supplied from the West Indies. Coal is found at Bogotá, in the coast-region back of Santa Marta, in Antioquia, and near Coli, in the Cauca valley, where an immense deposit exists; but no coal is mined. In Cundinamarca and Boyacá, on the lofty plains, and along the eastern slope of the Sumapaz range, down to the very level of the plains, occur deposits of rock-salt. At Zipaquirá, on the savanna of Bogotá, is the famous mountain of salt, to-day supplying all the interior of the republic, just as for centuries before the conquest it had supplied the Minsca empire. In Antioquia are found springs producing salt in quantities sufficient to supply that State.

The chief industry of Colombia is agriculture, but old methods still prevail. Wheat and potatoes are cultivated in the elevated regions, maize in all parts of the republic. Rice, yams, the yuca, the arracacha, and plantains are produced in the hot country. Cotton is perennial, and extensively cultivated in Santander and in the southern part of Cauca, hammocks and coarse stuffs being manufactured; its cultivation for export was increased in Bolivar and Magdalena, at the time of the civil war in the United States. Cacao is cultivated to a height of 3000 feet above the sea; sugar-cane up to 5000; coffee to 7000—the yield of each being abundant. Great quantities of coffee are shipped down the Meta, from Santander to ports in the Gulf of Maracaibo, and at Buenaventura; the cacao and sugar supply the home market. An excellent quality of tobacco is produced largely about Ambalema, in the upper Magdalena Valley, and in the districts of Cármen, Jiron, and Morales, in the lower valley, as well as near Palmira, in Cauca; it is exported from Barranquilla and Buenaventura. The production of indigo was stopped by the introduction of aniline dyes.

In the eastern and central cordilleras different varieties of cinchona occur, as far north as lat. 5° N., the trees of the eastern slope giving the better quality

of bark. This, packed in seroons of raw hide, finds its way to Sabanilla and Buenaventura. The bark from the district of Pitayó, of late years, has been shipped down the Putumayó. Vanilla, ivory nuts, sarsaparilla, and ipecacuanha abound in the hot country. The bamboo is abundant below an altitude of 4000 feet. Strawberries are found everywhere in the higher plateaus.

Vast herds of cattle graze on the *llanos*, in the Cauca, and on the isthmus. In the district of Pasto, in Southern Cauca, and in the great valley of Tensa, in Boyacá, there are numerous flocks of sheep; of the wool coarse goods are manufactured. The fibre of the indigenous aloe is made into cordage, coarse sacking, and *alpagartes*, or sandals. These stuffs are all manufactured by hand. Hats similar to those known to commerce as "Panama hats" are made of the leaf of the *iraca* palm at Suasa in Cundinamarca, and in Antioquia, but in quantities too limited for export. The few flour-mills of the interior have primitive horizontal water-wheels; lumber is sawed by hand. Dyeing and tanning are carried on to a very limited extent. The relation between imports and exports in recent years will appear from the following table:

	Imports.	Exports.
1875.....	$6,849,028	$9,984,386
1876.....	7,328,928	14,477,897
1877.....	6,709,109	10,049,071
1878.....	8,708,797	11,111,196
1879.....	10,787,654	13,711,511
1880.....	11,522,236	14,802,362
1881.....	12,183,970	15,836,943
1889.....	11,777,620	8,099,890

The transit trade across the Isthmus of Panamá is estimated at about $75,000,000 per annum.

Revenue.—The national income is very small, there being no direct taxation. The annual receipts increase slowly. For the biennial period of 1880–81 they amounted to $6,519,094, derived from the following sources: customs, $4,292,835; salt monopoly, $950,285; Panamá Railway, $260,000; Sabanilla Railway, $162,088; stamped paper, $51,709; postal service, $45,196; merchandise carried on the Magdalena, $74,832; imported salt, $34,206; telegraph, $43,842; national property, $2940; sale of ecclesiastical property, $18,263; mint, $28,147; passengers on navigable rivers, $5119; various, $649,632. The revenue for 1891–92 is estimated at $10,500,000. The expenditures for the same fiscal year will be, as per estimate $12,000,000.

Smuggling obtains to a considerable extent, although the evil is not so great as it was formerly. The recent reorganization of the custom-houses, and the establishment of a port of entry at Caquetá on the Putumayó, will probably tend to lessen smuggling. The postal service is not good, and the rate of internal postage is high; nor can this be otherwise until a better system of communication exists. In July, 1881, Colombia entered the postal union, and its foreign mail service has greatly improved in efficiency. There is telegraphic communication between Bogotá and the capitals of the several provinces, the total length of line in the republic at present being about 2800 miles. In 1881 a line was extended to the Venezuelan frontier, and another line is being constructed toward the frontier of Ecuador. A submarine cable now connects Buenaventura with Panamá, and the Colombian system of telegraph lines with those of the world. There were 400,000 telegraphic messages sent in 1881. The telegraph lin to the Government, except those of Antioqu which are property of that province. The telep troduced in Bogotá. The Panamá Railway is property of the Panamá Interoceanic Canal Co. The line from Barranquilla to Sabanilla was by the Government in 1876 for $600,000. railway to connect Buenaventura with Valley work progresses very slowly; many are projected, and on some of these of preliminary work has been done.

Until January, 1873, the foreign debt its $32,927,858. By an agreement of that with the foreign creditors this amount $10,000,000, paying an annual interest o per In 1878 the Government entered into an agreem apply annually £25,000 for the purpose of guishing this debt. In 1873 also an agr made with its creditors for the reduction o nal indebtedness. Aug. 31, 1882, the for amounted to $9,570,500, and the internal to $13,383,791. In July, 1889, an arrang made for the conversion of the foreign deb with interest, $14,381,015) into bonds definite periods, with interest at 3 and 4 The paper money had been reduced by Aug. 1, to $12,000,000.

By the terms of the new constitution the of the Colombian standing army is fixed at 65,00 executive is empowered to increase this, in of as circumstances may demand. The popu of the country is about 3,500,000. The Indians are reckoned at 200,000. Secondary tion was organized by a law of May law of July 2, 1870, the chief ve ized to organize primary public ru schools were organized in all the States. teachers brought to the country, pr Germany. A portion of the national re voted to the purposes of public number of schools is increasing. has been established at Bogotá, a mining capital of Antioquia, a nautical school at and a commercial college at Barranquilla. there were 437 students at the university. no exact official data concerning the pri of Panama and Santander; in 1883, 7 attended the 20 normal and 1431 other sch nine provinces. Antioquia has a university, provinces have established colleges and scho

Almost all of the not extensive literature by Colombia existed before the War for Indepe The Spanish conqueror of Bogotá, Gonzalo de Quesada, wrote an account of the as 1854 this work existed, still in MS., Library at Bogotá, but it has disap with many other valuable MSS. *Elegías de varones ilustres de Indias* were in Colombia, their author, Juan de C ex-soldier, being parish priest o Spaniards and a few natives of t chiefly clergymen—wrote books o Colombia. Toward the close of the celebrated José Celestino Mútis, hi gave a noteworthy though fleeting impu ture at Bogotá. Owing to his exa and those of Manuel del S. R who Bogotá with the best-beloved o de Ezpeleta, a small band of youths

lustre to the last days of Spanish rule. In 1781 the first newspaper appeared at Bogotá. Among these men the names of Zea, Cáldas, Nariño, the three Gutierrez, Acevedo, Valenzuela, Pombo, and Padilla are conspicuous. Many of these perished during the revolution, from which struggle the country emerged with its literary faculties paralyzed. Since that epoch there have been very few Colombian authors of note. Restrepo, Mosquera, Acosta, Perez, Groot, Plaza, and Vergara y Vergara are perhaps the only men who have produced works destined to be remembered. There is a good deal of ephemeral journalism in Colombia. The Spanish language lends itself to the making of verse, and the short-lived periodicals are full of poetry. In writing short articles descriptive of life in various parts of the country a few of the present generation of Colombians excel. There is, however, no national literature worthy of the name; what does exist is a poor copy of the French style of writing.

The boundaries of Colombia separating it from C a Rica and from Venezuela have never been well ed, and the subject is fruitful of dispute. Several maginary lines have been drawn on the maps as marking the boundary of Colombia on the side of Brazil. These circumstances make it impossible to state with precision the area of Colombia.

Perhaps to a greater extent than any other country globe Colombia gives evidence of long-continued catre volcanic action. Since the Spanish con- eral periods of severe earthquake-shocks e been recorded. The last great shock was on 16, 1875, when San José de Cúcuta, a flourishing in the coffee-producing region of Santander, was tely destroyed, and considerable damage was e in the neighboring States. The occurrence of er shocks on the same day of the following year rally alarmed the superstitious people. On Sept. , 1882, an earthquake threw down the most substantial buildings of Panamá and Colon, and very seriously damaged the superstructures of the Panamá railway: about one-third of the road-bed was rendered unserviceable, the rails being bent, or in places driven into the ground.

Concerning the commercial interests and facilities of the country some facts should be added. On the Caribbean Sea the trade of the ancient port of San Marta, forty miles E. of the mouth of the Magdalena River (the Magdalena is the great commercial highway of the country), has been absorbed by Sabanilla, situated on a bay of the same name, near the western mouth of the Magdalena. This latter is the port of Barranquilla, a thriving town of 25,000 inhabitants, on the left bank of the river near the sea. A railway of seventeen miles connects the two places, and although in 1876 the custom-house was removed to Barranquilla, Sabanilla remains the port of entry. The commodious Bay of Cartagena has also lost its commercial importance, and the *dique*, a waterway by which communication was had with the Magdalena, has fallen into disuse. Of the several good harbors on the isthmian coast (eastern), the so-called lagoon of Chiriqui, near the Costarican frontier, is one of growing importance. (G. B. G.)

COLONIES, The American.—In 1705, of the thirteen English North American colonies, seven—Virginia, rth Carolina, South Carolina, New York, New v. New Hampshire, and Georgia—were governed ro; provinces, and one description will suffice for all, if it be borne in mind that there were many minor local differences not here mentioned. These local peculiarities were due to the fact that, with the exception of New York and New Jersey, which were acquired by conquest, they had all been settled under the charter or proprietary form, although, in the course of time, in one way or another they had come into the king's hands.

In these provinces a governor, appointed by the crown, represented the king, held the chief executive power, summoned, prorogued, and dissolved the assembly, acted as chancellor, and sometimes even as chief-justice. Besides these prerogatives in the colonies, where the English church was established, the governor was the nominal head of the church, and as such had the power of "induction." In the discharge of these duties he was advised by a council of from eight to twelve members, appointed either by himself, or by the king on his nomination, and designed to act as a check upon him. But, as the governor possessed the right of appointment to the lucrative offices, these councillors were generally his creatures. The council sat with the governor as the highest judicial tribunal within the colony, and also formed the upper house of the legislature. The lower house, usually known as the assembly, consisted of a number of representatives—"deputies" or "burgesses"—who were elected by the freemen, possessed of a certain property qualification, of the counties, parishes, or towns, respectively, as the case might be. These assemblies in the early days wielded little power, but in the course of time they had acquired complete control of the colonial finances, and were thus able to oppose the royal officers with every chance of success, especially as in many provinces this control extended not merely to the raising and appropriating money, but even to the disbursement of the funds themselves. A bill, after it had passed the assembly, the council, and had not been vetoed by the governor, became a law in the province, but it might, at any time, be disallowed or repealed by the home authorities.

The main difference between the form of government of these royal provinces and that of the proprietary colonies of Maryland, Pennsylvania, and Delaware was that in the latter the proprietary was interposed between the colonists and the crown. That is, he appointed the governor and other colonial officers, and, theoretically at least, possessed the veto power. In reality the assemblies of these colonies, by their control of the colonial treasuries, were able to oppose successfully not merely the governor, but even the proprietary; especially was this true of Pennsylvania and Delaware, which, although under one executive, had each its own assembly. For in these colonies the council did not sit as an upper house of the legislature, but merely acted as an advisory board to the governor, and the assembly, therefore, possessed much more freedom of action than in the royal provinces, and not only held the purse-strings, but sat on their own adjournment. And again, in these two colonies the governor and council did not act as the highest judicial tribunal in the colony, for an appeal lay directly from a supreme court of four judges to the king in council.

Alone of all the chartered colonies, Connecticut and Rhode Island had retained their charters, under which the government was so completely in the hands of the people that, with the exception of a short bill of rights added in 1776, the charter granted by Charles II. in 1662 remained the fundamental law of Connecticut

colony and State until 1818, while Rhode Island was governed under the charter of 1663 until 1842.

Massachusetts had been settled by a trading corporation very similar in apparent design to the Virginia Company; but by the removal of the charter and government of the Company of Massachusetts Bay to this side of the Atlantic; by the subsequent admission of all "church members" to the freedom of the corporation; by the establishment of a representative system and of a judiciary; and by many other usurpations, the charter of a mercantile corporation had been converted into the constitution of a republican commonwealth, which Massachusetts really was until 1684, when the charter was declared forfeited and the "company" dissolved. For a few years the colony was governed for the crown, but after the overthrow of the Stuarts, Massachusetts, to which Plymouth colony and the province of Maine were joined, received what is known as the "Province charter," under which the province was governed until the Revolution. It differed from the old form in that a governor appointed by the crown, assisted by a council chosen by the assembly and approved by himself, appointed all the judges. But as the governor, the councillors, and the judges were all dependent upon the assembly for their salaries, the people ruled the province, although not so openly, perhaps, as before 1684.

As the organic laws of the colonies were very unlike, so were their systems of local government. The various systems may, however, be reduced to two, namely, local government by towns, or by parishes and counties; the one represented in its perfected form by the New England town system, while the other reached its greatest development in Virginia.

The Virginia of an early time seems to have been a collection of little villages occupied by some planter or overseer and his "servants," who labored for him and for the "company," but after the discovery that the cultivation of tobacco was very profitable, these villages, "cities," and "hundreds," as the old records term them, were abandoned. The population dispersed over a wide area, and the county took the place of the "city" or "hundred" as the unit of representation, of the administration of justice, and of the military system; while the county court, consisting of eight or more of the principal men of the county, in addition to rendering justice, had considerable authority in civil matters, as licensing taverns, building and repairing roads, etc., and received the presentments of the church-wardens, as the "ordinary" did at "visitation" in England. All other local or municipal authority was exercised by the vestries of the different parishes into which the country had been divided at an early day. At first the business of these parishes was transacted by the parishioners in vestry meeting; then the vestry was declared to consist of a certain number of men elected by the freeholders of the parish; but in 1662 the power to fill vacancies in their own bodies was given to the vestries, which thus became close corporations, or *select vestries*. It was their duty to elect church-wardens, to provide churches, glebes, and "parson houses," to present the minister to the governor for induction, and to provide his salary. In addition, they had charge of the processioning the bounds once in four years (the only system of land registration then existing in the colony), assessing the parish levy, and, with the church-wardens, the care of the poor. Of course there were many other minor duties, and it may be truthfully said that the vestry governed the parish as fully as

town.

The founders of Massach s ated in
organized groups of pe u lr u
the spiritual ministratio or sou
These groups settled at ifferent plas as u
harbor, and each group managed its own le
as it saw fit, all important business being t
a meeting of the whole body. After a wus a
mittee of select persons was appointed (
men, townsmen, or selectmen) to cond
affairs of the town, as it was called, and
of the town became less frequent, but t
held at least once a year for the ratifying or
of the selected men, for the selecting of new
the ensuing year, and for the discussion and u
of such business as it seemed desirable that the c
of the town should be had before entering u
These town-meetings were held in the meeting-
as the place of divine worship was called, and all
admitted to the Christian fellowship of the town
the church, and were called church-m
a time, none but these church-members were
to the freedom of the corporation; that is, to v
governor and other officers, and for deputies u
general court, as the legislature was na d; and
a brief period, none but church-memb had a
to speak and vote in town-meeting. Tl er
bility was removed in 1647 in favor of
taken the "oath of fidelity," and later still, m
was nominally abandoned with regard to all
In its place a property qualification was adopte
"Province charter."

The company guarded very carefully against dispersion of settlements, by adopting the town system as a basis of future colonization, and refusing to grant land to those who could not satisfy the authorities of their ability and intention of founding a town and "gathering a church." The general court also decreed that no house should be built in any town above half a mile from the meeting-house.

These towns then governed themselves in their town-meetings, and through their agents or selectmen, and were beside the unit of the ecclesiastical system, of the judicial system, of the military system, and of the system of representation. In fine, they were in all respects quasi dependent democracies; and though the central authority should be annihilated, government would go on nearly as well as before.

This is better shown by the fact that two collections of such towns confederated and obtained charters after settlement, and took their places in the colonial system as Connecticut and Rhode Island, although in the latter the connection between church and state was slighter than in Massachusetts.

There was an aristocracy in Massachusetts in 1765 as well as in Virginia, but owing to the smaller proportion of lower class whites in the former, and also to the fact that it was an aristocracy of wealth rather than of land, it had much less power in the State and became extinct during the Revolution.

The founders of Massachusetts and Vir ia
of purely English birth and education, and t
tutions are but the reproduction, survival or
ment of the institutions of En of the
their settlement. The same c t be said
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land, Sweden, France, and So G

important, in some cases the most important, element. Their institutions present no such strongly marked characteristics, and it may be said that Maryland and those to the south of her followed the customs of Virginia, while the middle colonies, owing to the diversity of employments, and the concentration of settlements, resembled New England more than they did the Old Dominion. (E. CH.)

COLONIZATION SOCIETY.—The process of abolishing negro slavery in the United States falls naturally into two periods: those of gradual and of "immediate" abolition. In the first period, that of gradual abolition, covering the years 1776–1830, very little work was at first done by societies for the gradual abolition of slavery. Their work resulted in the initiation of the steps which gradually abolished slavery in all the States east of the Mississippi and north of the Ohio river and "Mason and Dixon's line" (between Pennsylvania and Maryland). The first of the "old thirteen" States to begin abolition was very was New Jersey (1804), and here the work of the gradual abolition societies came to a close. An opposing influence had appeared—too strong for them to overpower. The invention of the saw-gin by Eli Whitney in 1793 had linked negro slavery to the cotton monopoly of the Gulf States, and had made slave-breeding equally profitable in the Border States. The gradual abolition societies could do no more than keep out the area of the future Free States, and their work, becoming more infrequent after 1804, soon stopped altogether. Their work had been done.

It was impossible, however, that the long-established anti-slavery sentiment should succumb so suddenly. It had been for years the settled hope of all leaders, North and South, that slavery would find its own eventual extinction. The abandonment of the hope of "gradual" abolition in the South left a vacuum, which was filled in 1816 by the organization of the American Colonization Society at Washington, in response to a recommendation resolution passed by the Virginia legislature Dec. 23, 1816. The corporate name of the association was "The American Society for colonizing the free people of color of the United States." Its "exclusive" object was to promote and execute a plan for colonizing, with their consent, the free people of color residing in our country in Africa, or such other place as Congress may direct. Its first President was Bushrod Washington, and for some twenty years most of the distinguished men of the country were connected with the Society as officers, members, or agents. Its meetings were common ground for such ill-assorted associates as Gerrit Smith, the Tappans, Birney, Benjamin Lundy, Frelinghuysen, Clay, Bishop Hopkins, Rives, and Fitzhugh. And for at least fourteen years it was the only organization whose influence had even the faintest tendency to check the expansion of slavery. To appreciate the condition of the sentiment of the country from 1816 until 1830 it is necessary to see how faint was the Society's tendency in opposition.

The exclusive object of the Society was to colonize free negroes; and this, not for the sake of the blacks, but for the sake of the whites. "Of all the descriptions of our population," said Clay, in a public address, "and of either portion of the African race, the free persons of color are the most corrupt, depraved, and abandoned." To get rid of this class was the exclusive object of the Society. It is true that many of its members had a vague idea that voluntary emancipation would be promoted by the existence of an agency ready to colonize the freedmen. But a little reflection ought to have shown that the more brilliant the success of the Society might become, the more effectually would this latter object be balked. If the Society could by any means emancipate and colonize so many as one-fourth of the slaves of the country, the only result would be to raise the value and price of the remainder, check emancipation, and drive slave-breeding to a still higher point of intensive industry. As an effort to remove negro slavery the work of the Society was a foredoomed failure.

But, in any respect, the Society had no brilliant success: its work was exasperatingly futile. It bought the territory near Cape Mesurado, now Liberia, in 1821, and made this its colonizing point. Its work there was placed in charge of Rev. Jehudi Ashmun, who remained in Liberia from 1822 to 1828. The society collected large amounts of money by voluntary subscription, which, with $130,000 voted by Congress, amounted to nearly half a million in 1834. As a result of this expenditure the Society had transported to Liberia, 1816–1834, inclusive, 2122 free negroes and 809 freedmen. Between 1820 and 1830 the free-negro population increased from 233,524 to 319,599, and the slave population from 1,538,038 to 2,009,043. The influence of the Society in simply dealing with the increase may very easily be imagined. When we add that the annual increase of slaves, 1850–60, averaged 75,000, or nearly twenty-five *per cent.*, it is a staggering question whether the work of the Society could, in any number of centuries, have caught up with the mere annual increase of slaves, and begun an attack upon the vastly increased main body.

In fact, the only result of the Society's work was that it persuaded the whole country to "mark time" for fourteen years on the slavery question. It intended to do nothing, and it not only did nothing most efficiently, but brought in multitudes of its natural antagonists to assist it in the work. Its effect on the free-negro class in the South was far worse. It excited hopes and expectations in their white neighbors, which could only be disappointed by the work accomplished. The emigration of the free negroes was to have been altogether voluntary; in reality, moral and physical pressure was applied to the free negroes in every direction to coerce them into emigration. There were about 320,000 free negroes in the United States in 1830, and those of them who lived in the Southern States were pressed on all sides toward an opening a hundred times too small for their passage. Many of them escaped to other States; others were re-enslaved, voluntarily or by process of law; and the percentage of increase of free colored, which had been 36.87 *per cent.*, 1820–30, fell successively to 20.87 *per cent.*, 1830–40, 12.46 *per cent.*, 1840–50, and 10.97 *per cent.*, 1850–60. That this decrease was not due to the Colonization Society's work is apparent from the average number of colonists, 400 *per annum*, sent to Liberia by the Society, 1850–60. From 1820 until 1856 the Society sent to Liberia 9502 emigrants, an average of 264 *per annum:* the free negroes numbered 3676.

The slow work of the "gradual abolition" societies faded out about 1810. From 1816 until 1830 the country was marking time on the slavery question under the leadership of the Colonization Society. In 1830 the sudden demand of William Lloyd Garrison for "immediate" abolition threw the whole parade into confusion, and began a new period in the discussion which is considered elsewhere. (See ABOLITIONISTS.) The first point of attack by the "immediate" abolitionists was naturally the Colonization Society:

and the Society's prospects of growth, if it ever had any, ceased and determined with the first attack.

See *The African Repository*, the Society's organ; the Reports of the Society (its address is Secretary of the American Colonization Society, Washington, D. C.); William Jay's *Inquiry into the Character of the Colonization Society* (in his *Miscellaneous Writings on Slavery*); A. Alexander's *History of West African Colonization* (1849); Stockwell's *History of the Republic of Liberia* (1868); *U. S. Census Reports.* (A. J.)

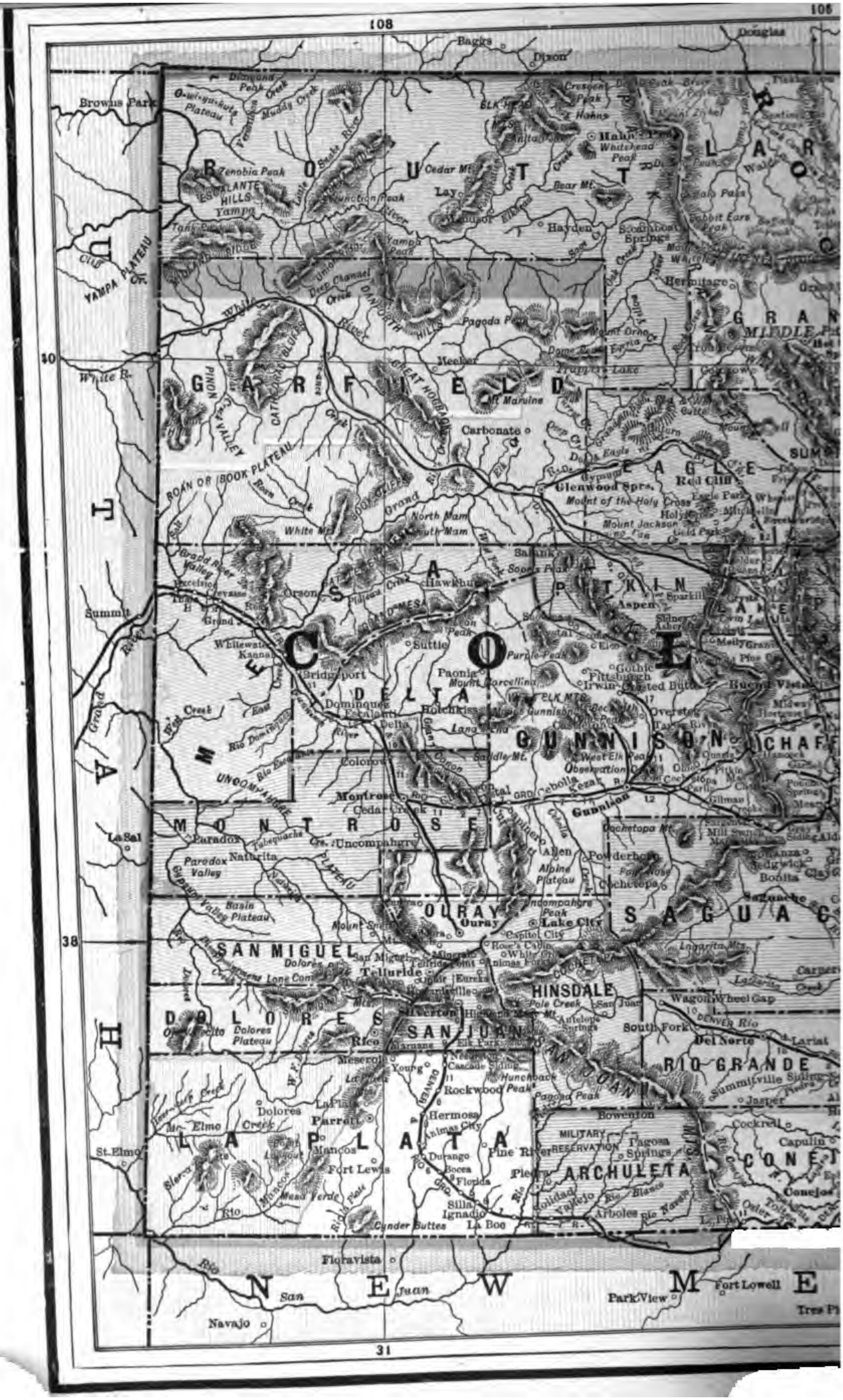
COLORADO, one of the United States of America, takes its name from the Rio Colorado of the West, some of the main head-streams of which have their sources within its borders. Its area, according to the U. S. census of 1880, is 103,645 square miles. It is situated between the parallels of 37° and 41° N. lat. and between the meridians of 102° and 109° W. long. Its width from N. to S. is about 280 miles, and its length from E. to W. 370 miles. In area it is the third among the States, being exceeded by Texas and California only. Somewhat less than one-half this region came to the United States by the Louisiana purchase in 1804; those parts which lie south of the Arkansas River and west of the main chain of the Rocky Mountains were acquired in 1848 from Mexico, under the treaty of Guadaloupe-Hidalgo. The Spanish title to this region took date from 1570, when Vasquez Coronado traversed it with his military force. It afterwards became a part of New Mexico, and early acquired a small Spanish-American population, principally seated in the valley of the Rio Grande.

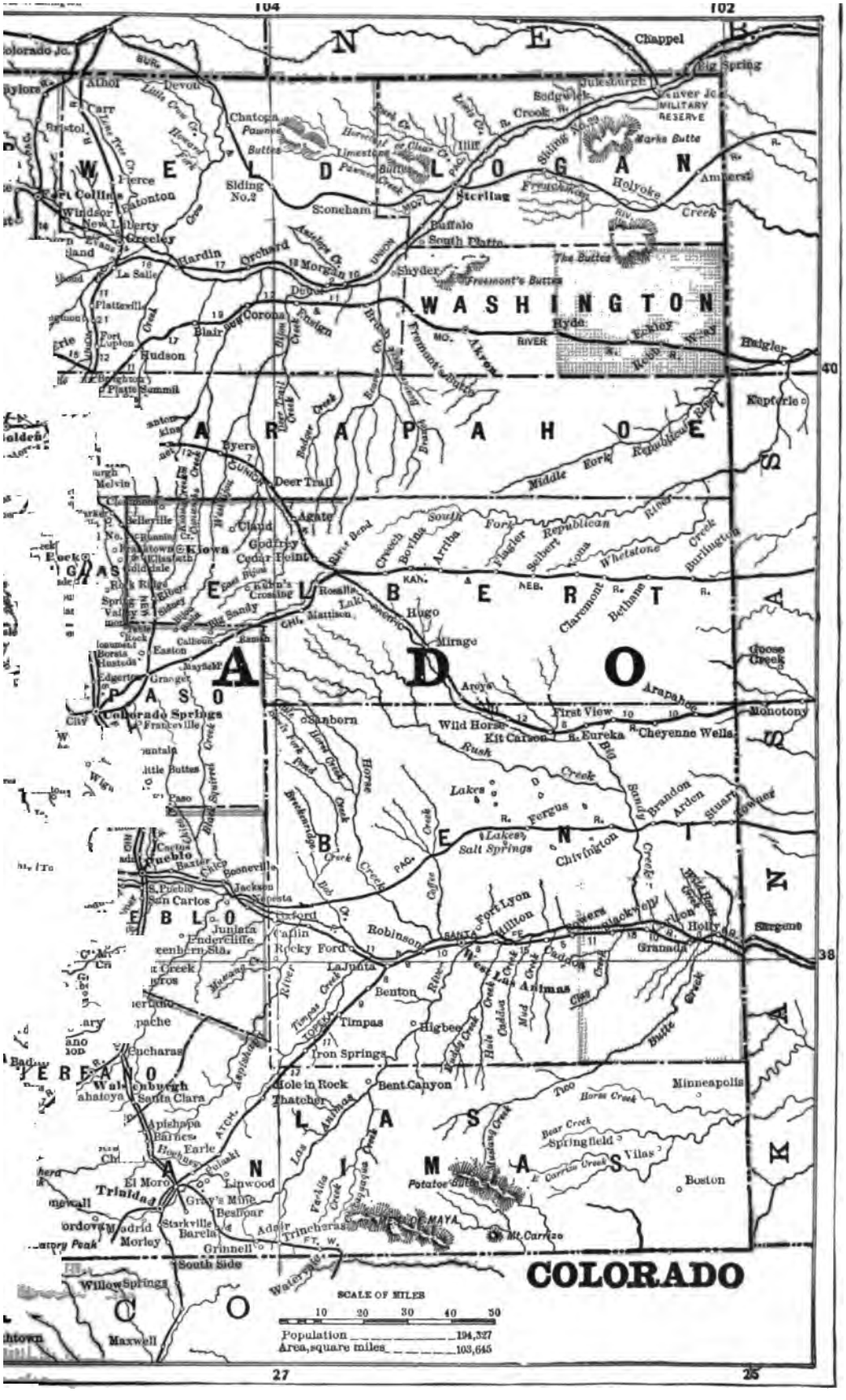
See Vol. VI. p. 145 Am. ed. (p. 161 Edin. ed.).

Surface.—Colorado is by nature divided into several distinct and well-marked sections:

(1.) The *Great Plains*, which occupy over one-third of its eastern half, being the western border of the open and comparatively treeless country which slopes westward, with little break or variety of surface, from the Mississippi River to the foot-hills of the main Cordillera. Along these foot-hills the plain has a general altitude of nearly 5000 feet. (2.) The *Foot-hill Country* crosses the State from north to south, and has a breadth varying from 25 to 50 miles. This belt has some richly metalliferous districts, but is especially adapted to grazing, being well watered, tolerably well timbered, and in general very fertile. Its surface is diversified, and in some parts rocky and broken. (3.) The *Rocky Mountains* occupy a large area, ranging from north to south across the State in a succession of approximately parallel chains, themselves looped together by an intricate plexus of cross ridges, as well as outlying spurs and isolated groups. Indeed all the region lying west of the principal mountain-ridges is in general mountainous. Among the principal peaks as yet named and measured are the following: Blanca Peak, the highest in the State, and one of the highest in the whole country, 14,464 feet; Mt. Harvard, 14,408; Long's Peak, 14,271; Pike's Peak, 14,147; Holy Cross, 14,176; Mt. Æolus, in the S. W., 14,054; Mt. Wilson, 14,280; Uncompahgre Peak, 14,238; Mt. Bowles, 14,106; Mt. La Plata, 14,126; Mt. Elbert, 14,150; Mt. Massive, 14,368; Castle Peak, 14,106; Mt. Ouray, 14,043; Mt. Yale, 14,151; Mt. Lincoln, 14,123. Among the separate ranges there are in the N. W. the Sierra Escalante, the Elkhead Range, and the Boan Mts. farther S.; in the N. E. the great Snowy Range, here the main ridge, and continuous to the N. W. with the Medicine Bow Mts.; in the S. W. quarter the Elk Mts., the San Miguel, the Uncompahgre and the La Plata Ranges and the great Sierra San Juan: and in the S. E. the Raton, the Sangre de Cristo, the Wet, and other ranges. There are said to be probably over a hundred peaks exceeding 13,000 ft. in height, and many which are over 14,000 ft., some of the latter being unmeasured and many unnamed. Of the Rocky Mountain passes in this State Argentine is the highest, being 13,000 feet above the sea, and can be used only in the summer. There are five others above 12,000 feet high, and seven below 10,000 feet.

Nearly all the towns in Colorado are situated in the mountain region, and the remainder are chiefly in the foot-hills. The mountains are crossed by numerous passes. Kenosha Divide is crossed by the Denver and South Park Railroad at the height of 10,139 ft.; Jefferson and Webster stations on that road have respectively altitudes of 9754 and 9120 ft. The city of Georgetown is 8514 ft. above tide; Raton Pass, on the Atchison, Topeka, and Santa Fé Railroad, 7863 ft.; Denver, the State capital, 5197 ft.; Leadville, a celebrated mining town, 10,247; Present Help mine, 14,000 ft. There are several mining-camps at or near 10,000 ft. high. Over 500 sq. m. of the State's area are above 13,000 ft., and some 10,000 sq. m. are between 9000 and 10,000 ft. The Argentine Pass is 13,100 ft. high. The lowest point in the State is over 3000 ft. The valleys, many of them deep and narrow, but others wide, are very generally timbered and well watered. When these valleys become very spacious they are termed *parks*. The North, Middle, South, and San Luis are the largest. The park lands are level or undulating, forming natural lawns, hillsides and dells of great beauty, the vegetation in its season being abundant and botanically interesting. These parks are regarded as former lake-basins, some remnant of the former watered area frequently remaining. These beautiful mountain walled parks, with their enclosed lakelets, are among the most attractive features of this grandly featured State. Other interesting characteristics are afforded by the cañons, or deeply ploughed channels, along which flow the rivers, chiefly those of the W. and S. W. The walls of these cañons are often perpendicular, and in some cases they incline inwards. The Gunnison or Black cañon winds its way for miles between walls over 3000 ft. high, and from 300 to 600 ft. asunder. Other remarkable cañons are those of the Arkansas and the Uncompahgre. The former is well known to tourists, being traversed by a line of railway which displays astonishing engineering skill and daring. On the W. side of the main mountain-axis are extensive arid plateaus, or elevated treeless plains. Here are also *mesa* lands, or flat-topped tables of land, bounded entirely or in part by steep scarps, or walls up which it is difficult to climb. These are often well supplied with grass on the top,


108
106
40
38
31
Baggs
Dixon
Douglas
Browns Park
Zenobia Peak
ESCALANTE HILLS
Yampa
Cedar Mt.
Lay
Junction Peak
Bear Mt.
Hayden
Steamboat Springs
Hermitage
YAMPA PLATEAU
Cliff Cr.
White R.
Danforth Hills
Pagoda Peak
Meeker
Trappers Lake
GARFIELD
Mt. Marcelline
Carbonate
ROAN OR BOOK PLATEAU
Roan Creek
White Mt.
North Mam
South Mam
Grand
EAGLE
Gypsum
Glenwood Sprs.
Red Cliff
Mount of the Holy Cross
Mount Jackson
Red Cliff
Grand River Valley
Orson
Mesa
Hawkhurst
GRAND MESA
PITKIN
Aspen
Sparkill
Summit
Grand
Whitewater
Kannah
Suttle
Paonia
Purple Peak
Pittsburgh
Irwin
Gothic
Bridgeport
DELTA
Dominguez
Escalante
Delta
Hotchkiss
West Elk Mts.
GUNNISON
CHAFFEE
Buena Vista
Colona
Saddle Mt.
West Elk Peak
Observation
Montrose
Cedar Creek
Gunnison
UNCOMPAHGRE
La Sal
MONTROSE
Paradox
Naturita
Paradox Valley
Uncompahgre
Allen
Powderhorn
Alpine Plateau
Cochetopa Mt.
Cochetopa
Bonita
Saguache
SAGUACHE
Basin
Plateau
OURAY
Ouray
Uncompahgre Peak
Lake City
Capitol City
SAN MIGUEL
San Miguel
Telluride
Dolores
Lone Cone
HINSDALE
Pole Creek
Wagon Wheel Gap
DOLORES
Dolores Plateau
Rico
Silverton
SAN JUAN
South Fork
Del Norte
Lariat
RIO GRANDE
Summitville
Jasper
Rockwood
Hermosa
Animas City
Durango
Bocea
Florida
Dolores
Parrott
La Plata
LA PLATA
Mancos
Fort Lewis
Mesa Verde
Mt. Elmo
St. Elmo
Pagosa Peak
Bowenton
MILITARY RESERVATION
Pagosa Springs
ARCHULETA
Pine River
Piedra
Arboles
Silla
Ignacio
La Boca
Cinder Buttes
CONEJOS
Conejos
Cockrell
Capulin
Floravista
San Juan
NEW MEXICO
Park View
Fort Lowell
Navajo
UTAH
COLORADO


COLORADO
WELD
LOGAN
WASHINGTON
ARAPAHOE
ADAMS
ELBERT
LINCOLN
EL PASO
PUEBLO
BENT
PROWERS
KIOWA
CROWLEY
OTERO
BACA
PROWERS
KIT CARSON
CHEYENNE
LINCOLN
Chappel
Big Spring
Julesburg
Sedgwick
Crook
Denver Jct.
MILITARY RESERVE
Marks Butte
Holyoke
Amherst
Sterling
Stoneham
Buffalo
South Platte
Fremont's Buttes
Hyde
Snyder
Akron
Brush
Fort Morgan
Hudson
Fort Lupton
Platteville
Greeley
Windsor
Fort Collins
Chatoga
Siding No. 2
Hardin
Orchard
Corona
Deer Trail
Agate
Elbert
Kiowa
Cedar Point
Rush Creek
Bijou Creek
Rush
Lakes
Salt Springs
Hugo
Mirage
Arroyo
Colorado Springs
Monument
Sanborn
Wild Horse
Kit Carson
First View
Eureka
Cheyenne Wells
Monotony
Goose Creek
Pueblo
Boone
Jackson
Nepesta
San Carlos
Fort Lyon
Holly
Sargent
Granada
Junlata
Rocky Ford
La Junta
Robinson
Hilton
Benton
Timpas
Higbee
Iron Springs
Mole in Rock
Thatcher
Bent Canyon
Minneapolis
Springfield
Vilas
Boston
Apishapa
Barnes
Earle
Hoehne
El Moro
Linwood
Trinidad
Gray's Mine
Beshoar
Madrid
Starkville
Barela
Morley
Grinnell
South Side
Willow Springs
Maxwell
Trinchera
Adair
Mt. Carrizo
Potato Butte
Timpas Creek
Apishapa Creek
Horse Creek
Two Horse Creek
Bear Creek
Big Sandy
Republican River
Middle Fork
South Fork
Arikaree
Whetstone Creek
Burlington
Claremont
Bethany
Kanorado
Goodrich
Melvin
Claud
Eyers
Easton
Calhoun
Ramon
Edgerton
Granger
Boreas
Hastedt
Rock Rider
Ellicott
Calhan's Crossing
Rosalia
Lake
Mattison
Chl.
Graneros
Wigwam
Little Buttes
Black Squirrel Creek
Fountain Creek
Horse Creek
Brush Creek
Lake Creek
Salt Creek
Big Timber Creek
Two Buttes Creek
Caddoa Creek
Mud Creek
Las Animas
Timpas Creek
Iron Springs
Bent Canyon
Thatcher
Mole in Rock
Apishapa
Barnes
Earle
Hoehne
Linwood
Trinidad
Gray's Mine
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Graneros
Wigwam
Little Buttes
Black Squirrel Creek
Fountain Creek
Horse Creek
Brush Creek
Lake Creek
Salt Creek
Big Timber Creek
Two Buttes Creek
Caddoa Creek
Mud Creek
Las Animas
SCALE OF MILES
10 20 30 40 50
Population 194,327
Area, square miles 103,645
104
102
40
38
27
25

are quite frequently of large extent, but water is ally difficult to find. The plateaus and mesa lands enerally are from 5000 to 8000 ft. high. A good art of this western versant has been until latterly a eservation for the Ute Indians; and this region is omparatively unpeopled, and some parts are little nown to white men.

Rivers and Lakes.—Colorado, like most other egions with many remarkably high mountains, is a rand hydrographic centre. Here rise the South latte, the Arkansas, the Rio Grande del Norte (all wing to the Atlantic by way of the Gulf of Mexico, ue last named stream directly, the others mediately), nd the San Juan, Dolores, Gunnison, White, and 'ampah, all principal head-streams of the Colorado f the West, which receives all the waters of the 'acific versant of this State. None of the streams are avigable. Many of the minor streams have cascades f great beauty. The streams of the eastern slope re largely utilized in irrigation works; but many of he rivers and creeks, chiefly in the W., flow in ions so deep that they can never be diverted into rigating canals. The presence of lakes or lakelets i many of the mountain valleys has been already oticed. Of these, the lowest is over 7000 ft. high, nd Chipayo Lake, the highest, has an altitude of 1,500 ft. The eastern plains are in general but antily watered.

Cl te.—Like all mountain countries this State y climates at once. At midsummer the and foot-hills sometimes become heated and nfortable; but the higher mountain towns have very agreeable summer climate. The foot-hill ntry has a mild winter climate, the snow never be- ng very deep and seldom lying long. Sharp mal changes are common, but they do not so ly affect the sensations as in lower and moister

as the climatology of Denver, situate 5197 ft. ove sea-level, fairly represents that of both the and the foot-hill country, we append its weather ord. By this the mean monthly temperature pears to have been nearly as follows: January, 28°; ebruary, 35°; March, 36°; April, 49°; May, 61°; ne, 64°; July, 74°; August, 71°; September, 63°; ctober, 51°; November, 38°; December, 28°; the ghest temperature, during this period, 98°, having en reached in the month of July—lowest, 20° below ro, occurring in the month of January; annual average precipitation, snow and rain, 15 in. of water. There curred during this time a yearly average of 162 clear ys; 135 that were fair or partly clear; 15 that were oudy but not stormy, and 53 that were more or less ormy, there having been but few entirely stormy ys in any year. Not very often, in fact, do either ow or rain fall here continuously for 24 hours. The n of snow-falls reaches from November till March, most of the rain falling during the later spring and summer months, and occurring in the form of owers. The line of perpetual snow ranges between ,000 and 13,000 ft., although in some places, as on e northerly slopes of the mountains and where it ifts into deep cañons, it lies throughout the summer uch lower down. It is one of the thermal peculi- ities of this region that a strong west wind in e winter, though passing over more than a thousand iles of snowy mountains and elevated deserts, is apt be dry and warm, the snow disappearing rapidly s it. On the other hand a wind from the east is usually more cold and damp. The climate of Colorado is generally favorable to physical vigor and health, there being here few diseases of an endemic kind. Fever and ague are not common, though rheumatic ailments and mountain fever prevail to some extent. A residence in almost any part of the State is so apt to benefit persons suffering from bronchial and pulmonary complaints that it may be considered a sanitarium for this class of invalids.

There are in Colorado a large number of mineral springs, for which great medicinal virtues are claimed. To some of these springs large numbers of the sick and infirm repair every summer.

Flora and Fauna.—Colorado is tolerably well wooded throughout the mountainous districts, and the country almost everywhere is fairly stocked with animal life. The plains to the east are without trees except belts of cottonwood, aspen, willow, and like inferior timber along the rivers. To supply this deficiency, tree-culture is being practised by the settlers, not yet numerous, in this part of the State. The timber on the foot-hills and mountains consists mostly of pine, spruce, fir, hemlock, and cedar, with a little oak and some other hard woods in the valleys and along the foot-hills. These mountain forests up to an altitude of 9000 or 10,000 ft. are composed mostly of large and stately trees, the growth above this being more sparse and scrubby up to the edge of the timber line, which occurs at a height of about 12,000 ft. Most of the plants and shrubs found elsewhere in the Rocky Mountains or common on the western plains are here indigenous, the country everywhere save in the denser forests being in spring-time covered with wild flowers, bright hued and graceful, but lacking in perfume.

In the zoölogy of Colorado the buffalo or wild bison stands foremost, immense herds of these animals being found on the lowlands of the State, which have ever been one of their principal habitats. Though destroyed of late by thousands every year, they still swarm over parts of the vast champaign, where they are pursued by the hunter, as a matter of business, and by the pleasure-seeker, for sport. At the rate they are being killed off, the buffalo, as a denizen of the country, must suffer extinction. There are found two or three species of the deer and as many of the wolf family; some hares, with more valuable fur-bearing animals. Prairie dogs by the million inhabit these plains. In the uplands, besides deer, hares, and wolves, bears, panthers, wildcats, beavers, and otters, with much small game, including wild fowl of various kinds, are more or less plentiful. Antelopes of two kinds (one called mountain goat), and the Rocky Mountain sheep, are also found.

Agricultural Resources.—While the more immediate resources of Colorado's wealth lie in her mines, she still possesses a considerable amount of good farming with an immense extent of first-class grazing lands, Colorado ranking 4th as a cattle and 13th as a sheep-raising State. Her standing as regards agricultural products furnishes no just criterion of her capacities in that direction, the most of her population being engaged in mining, stock-raising, and other pursuits. In the several particulars named below her standing among the States and Territories is as follows: in the production of barley, 24; wheat, 27; oats, 32; corn, 37; horses, 36. The great drawback to agricultural pursuits here is the necessity that exists for irrigation, without which no crop, whether of grain, vegetables, or fruits, can be matured; the application of artificial

moisture in the case of fruit trees, vines, etc., being necessary only for two or three years at first, until the plantings get well rooted. The more delicate fruits and vegetables cannot well be grown in this State owing to the occurrence of frosts late in the spring and early in the autumn. All the hardier varieties, however, with the aid of irrigation, thrive and mature everywhere except in the higher mountains. The cereal crops with proper care yield well, wheat at the rate of about 20 bushels per acre. In 1888 the yield was as follows: wheat, 2,516,843 bushels; oats, 1,565,385; corn, 908,224; and potatoes, 2,856,864 bushels. The hay crop, formerly 50,000 tons yearly, is steadily increasing; value of dairy products, $400,000; of gardens, $250,000. For bringing water on the land for irrigating purposes many ditches have been made, some of these being long and costly structures. The Larimer and Weld Canal, which takes water from the Cache-la-Poudre, has a total length of 54 miles, with a capacity to irrigate 120,000 acres of land. The Greeley colony has nearly 40,000 acres of fertile land under ditch, the most of it in a high state of cultivation, and there are other proprietors, individual and corporate, who have reclaimed large tracts by bringing water upon them. The total amount is about 2,000,000 acres. There are in all over 4000 miles of irrigation ditches, along the valley of the Arkansas and of the western rivers.

Besides the unseasonable frosts and the aridity of the climate the Colorado husbandman and horticulturist have a variety of insect pests to contend with. The most formidable of these is the grasshopper, or Rocky Mountain locust, which formerly gave much trouble, devouring every green thing; but of late years these insects have caused less damage, the cultivators of the soil having found means to check their ravages.

Stock-raising has proved a very profitable industry in Colorado, the conditions for conducting this business on a large scale being here exceedingly favorable. With the exception of work animals, neither horses, neat cattle, nor sheep receive winter-shelter or fodder, and yet they keep in good condition for most of the time, not generally becoming very poor, even in winter. If the winter proves very severe, as occasionally happens, much stock is lost through cold and starvation, but the owner, finding it cheaper in the long run to incur these losses than to make provision against them, leaves the animals to take their chances. Despite these losses, and a general lack of care, domestic animals, feeding on the nutritious grasses so abundant in this country, multiply rapidly. Colorado has nearly 1,500,000 head of neat cattle and nearly 3,000,000 sheep, notwithstanding large numbers of these animals are slaughtered for home use, or sent out of the State every year. The annual shipments of beef cattle east by rail average now nearly 100,000 head; the annual wool product of the State approximating 6,000,000 pounds. The stock of both sheep and neat cattle, which lately consisted for the greater part of the gaunt Mexican breeds, has been much improved by the introduction of blood animals. The values of cultivated lands, including improvements, may be roughly estimated at $20,000,000; value of horses and mules, $7,000,000; neat cattle, $35,000,000; sheep, $0,000,000. The annual receipts, gains, and profits arising from farming in all its branches, and from sheep and cattle raising, sales and increase included, may be set down at $20,000,000 for the whole State. The assessed valuation of all the taxable property in the State amounted in 1878 to $43,055,419, and in January, 1884, it had risen to $110,759,756.

Mines and Mining.—Gold placers were first found in Colorado in 1858, the site of this discovery being on the head-waters of the South Platte, a region afterwards known as "Pike's Peak." The reports of this "find" spreading through the East, a heavy emigration set in towards the new diggings the following spring, and for several years was kept up with little abatement. As additional deposits continued to be discovered, giving profitable employment to a large population, a considerable production was made here from the first; the out-put of gold during the ten years following 1859 having averaged about $3,000,000 per year. The most of this was gathered from the placers, though the contributions of the auriferous quartz veins, which meantime had begun to be worked, amounted to some twenty or thirty per cent. of the whole.

After the more tractable surface deposits had been exhausted and the highly sulphureted or otherwise refractory ores were reached, defeating their successful treatment by the inefficient processes then in use, quartz mining experienced a great set-back, from which it did not so far recover as to become an active factor of bullion production, until about 1870, since which time the business has made steady advancement.

Although argentiferous ores were discovered at an early day silver did not begin to figure much in the bullion returns of the country until 1868, gold in point of value remaining the preponderating metal up till 1873, when silver took the precedence, which it has held ever since, the disproportion of late years having been as 3 to 17. Prior to 1874 most of the richer silver ores were shipped out of the country, only very inefficient means for reducing this class of ore having been provided near the mines. With the erection of smelting works about that time silver and lead began to be turned out, and great quantities of metal have since been produced by the many smelters brought into operation, some of which are of large capacity.

Colorado ranks first among the States and Territories in production of silver, and third in production of gold. While no very accurate statistics have been kept of the bullion production in the earlier years, the total amount approximates $300,000,000, value of gold and silver. According to the most authentic accounts the annual product during a period of twelve years was in round numbers as follows: 1872, $3,800,000; 1873, $4,000,000; 1874, $5,400,000; 1875, $5,450,000; 1876, $6,200,000; 1877, $7,400,000; 1878, $10,000,000; 1879, $19,000,000; 1880, $20,000,000; 1881, $21,000,000; 1882, $26,000,000; and 1883, $26,306,131. In 1888 the product was, gold, $3,758,000; silver, $19,000,000; making a total of $22,758,000, of this more than one-half came from the Leadville district, which also gave a valuable output of lead, its yield being 73,749 short tons. Of the Leadville product, about 20 per cent. consisted of lead, and the remainder nearly all of silver, the value of gold amounting to hardly more than one per cent. of the whole.

As a great number of mines have now been opened and fitted with hoisting and reduction works, and railroads have been built into most of the important mining districts, the metallurgical difficulties that formerly caused so much trouble having, meantime, been pretty well overcome, it may be expected that

the bullion product of Colorado will render a marked increase for some time to come. Should an annual increment of ten per cent. be made for the next decade, doubling the present product at the end of that time, it would only fulfil the anticipations of those best acquainted with the resources and the industrial outlook of the State.

Besides gold, silver, and lead, Colorado abounds with deposits of the useful metals; being rich also in nearly every metal of economic value. Some of the more accessible of the deposits of coal and iron have already been extensively and profitably utilized, the iron ore worked being nearly free from sulphur, phosphorus, and other injurious substances, and containing on an average sixty per cent. of metallic iron. These ores are of many varieties: hæmatite and magnetite being the prevailing kinds. The total product for 1882 was valued at $2,650,000. The total product for 1888 was 20,877 tons. The Bessemer Steel Works, erected by the Colorado Coal and Iron Company, at South Pueblo, have capacity to make 30,000 tons of steel rails per annum. This company owns over 100,000 acres of iron, coal, and other mineral-ing lands in the State, and has erected large fur-s at different points for smelting its iron ores: -s of these works, the Calumet, near Salida, being ted at an elevation of more than ten thousand feet. ile the most of the coal deposits owned by this y are of the bituminous variety, extensive -s of anthracite have been opened up in the Gunni-country which contain over ninety per cent. of on. As some of this coal can be coked readily, -s have been put up at El Moro 250 ovens that -ept constantly employed in the business of coking. cheap and of good quality, mineral fuel is into extensive use, being employed not only -r domestic purposes but also for generating steam the railroads and in the crushing mills, many of the -s also using it. The coal is, however, of -ous origin. In 1888 the total output of all kinds of -l in the State was 2,185,478 tons. The total production of coke was 179,682 tons. Although copper ores of high grade have been found in many parts of the State, but little has been done with them. Common salt is abundant in Colorado, occurring in springs, on surface incrustations, in numerous places. Sulphur and gypsum are also plentiful, while the finding of opals, chrysolites, and other gems has from time to time been reported. Whether precious stones exist in such quantity as to be worth extended search remains to be determined.

Railroad System.—None of the States or Territories west of the Mississippi have been so well supplied with railroads as Colorado: these avenues of travel and traffic penetrating very generally the eastern, southern, and middle portions of the State. The railways completed and in operation within the State aggregate 4038 miles in length, there being several hundred miles of track projected, some parts of which are in course of active construction. One company, the Denver and Rio Grande, own and operate 1317 miles of railway, and are constantly extending their completed roads, or building additional branches for the accommodation of side localities. Into districts known to be rich in minerals, but which, owing to the difficulty of reaching them have been but little settled, this company has to some extent adopted the policy of building roads in advance of business and population, trusting to the growth which would follow cheap transportation for remunerative returns. Besides short local roads this company has completed a railway reaching west several hundred miles to Salt Lake City, Utah. The most of the country traversed by this work is rough and mountainous, presenting formidable obstacles to railroad construction. Although railroad building in Colorado, except on the plains, has been attended with heavy expense, these enterprises, by reason of the rapid growth of the country, are likely to prove profitable: many of them having already made large net earnings. The total length of track in 1884, including sidings, was 4000 miles, and the assessed value of railroad property was $20,224,293. Over two-thirds of the mileage consist of the standard broad gauge, the narrow track being confined mostly to the mountainous districts. In the construction of these mountain roads, some of which reach great elevations, approached over steep grades and through rocky cañons, immense engineering difficulties were encountered, which have, however, been boldly met and skilfully overcome.

History.—As early as 1859 movements began in Colorado looking to the framing of a State government. Accordingly a constitution was that year drafted, but on being submitted to the people for adoption it was rejected. In 1861 Congress organized a government for the Territory. William Gilpin, a member of the Society of Friends, was appointed Governor, and H. P. Bennett was elected Delegate to Congress. In 1862 Gilpin was succeeded by John Evans as Governor. In the next year Congress having passed an enabling act, a convention was held and a constitution framed. This constitution on being submitted to the people was also rejected, but by such a small majority that the effort was renewed in the following year, and the same constitution, with some modifications, was adopted. Congress thereupon passed a bill admitting Colorado into the Union. But this bill having been vetoed by President Johnson, the people were still left under the territorial form of government. In 1875, the State movement having meantime been revived, Colorado was authorized by act of Congress to frame a constitution. This was done by a convention, and the result ratified by the people, July 1, 1876. On July 4 of that year Colorado was admitted into the Union, and hence is sometimes called "the Centennial State." In accordance with the requirements of its constitution Colorado has no bonded debt. Its total indebtedness on Nov. 18, 1890, was: funded debt, $150,000; unfunded debt, $1,187,-254. The revenue of the State amounted to $1,568,601; while the expenditures were $1,563,076; of the receipts, $756,744 were raised by taxation, on a tax rate of 40 cts. on the $100. The State warrants bear interest at six per cent.

Population, Leading Cities and Towns.—According to the U. S. Census of 1880 Colorado contained 196,649 inhabitants. This number was ascertained to have increased to 410,975 in 1890, the population having grown partly through the influx of miners, and still more through the rapid development of the agricultural capabilities of the State, the result of active measures of irrigation. Many of the cities and towns of the State have increased decidedly in population, this being particularly the case with Denver, the State capital and business centre, which has grown from 35,629 in 1880 to 106,713 in 1890. Leadville, the metropolis of the carbonate mining region, has, on the contrary decreased in population, receding from 14,820

to 11,212. Pueblo, the third city in size, has grown from 3,217, to 24,558. The other towns of the State are Georgetown, Central City, Greeley, Kokomo, Lake City, Trinidad, Golden, Boulder, and Cañon City.

COLORADO POTATO BEETLE.—This beetle was first described by Thomas Say, from specimens collected in the region of the Upper Missouri, as *Doryphora 10-lineata*. Its original food-plant is *Solanum rostratum*—a common western species. As the cultivation of the potato reached the native home of the beetle, this last gradually acquired the habit of feeding upon it, and then began its historic spread towards the East. In 1859 it had reached a point 100 miles west of Omaha, Neb., and in 1864 and 1865 it crossed the Mississippi River into Illinois. In its eastern spread from this point it was a noticeable fact that the southern columns lagged far behind the northern ones. In 1869 it reached Ohio. In 1871 it was found in New York and Pennsylvania, and in 1873 it had reached the extreme eastern limit of these States. In 1875 it arrived at Boston, and in 1876 spread along the sea-coast of New England, extending as far north as Quebec, and south into Virginia.

Its natural history may be thus summed up: It hibernates in the beetle state beneath the surface of the ground or under rubbish. The eggs, to the number of from 500 to 1000, are laid in spring, mostly on the underside of the leaves. The larvæ hatch in less than a week, attain their full growth in from two to three weeks, pupate under ground, issuing again as beetles in a little more than a month from the time of the hatching of the eggs. There are two or three broods in the course of the season, the number depending upon the latitude. Its food-plants include most of the Solanaceæ, and when hard pressed it will feed for a while on the garden cabbage, the common thistle, and many of our common weeds. Among its natural enemies may be mentioned several species of insectivorous birds, several spiders, a mite, which has been described as *Uropoda Americana*, two or three species of wasps, a number of the useful little Ladybirds (*Coccinellidæ*), many species of Ground-beetles (*Carabidæ*) and Tiger-beetles (*Cicindelidæ*), a species of Rove-beetle (*Philonthus* sp.), many of the soldier-bugs, a Tachina-fly (*Exorista doryphoræ*, Riley), and an Asilus-fly (*Protocanthus milberti*, Macq.).

Remedies.—Where the "potato-bug" is to be fought in small gardens, many are led, from fear of the poisonous qualities of Paris Green, to prefer the more laborious method of hand-picking. The beetles are crushed with gloved fingers, or are knocked into pans and then destroyed with hot water or kerosene. The use of London Purple or Paris Green, mixed with flour or dissolved in water, will, however, be found the cheapest and most efficacious of all proposed remedies, and it has been repeatedly shown that the danger from the use of these poisons may, with proper care, be reduced to almost nothing, since they do not influence the soil and are not absorbed by the plant. Paris Green may be diluted with from twenty-five to thirty times its weight of flour, and still be efficacious, and, dissolved in water, the proportion is, roughly, one tablespoonful of the Green to a bucketful of water. (C. V. R.)

COLORADO SPRINGS, the county-seat of El Paso co., Col., is on the Denver and Rio Grande R road, 10 miles east of Pike's Peak, and 75 miles s. of Denver. It has 3 banks, an opera-house, 2 d and 3 weekly newspapers, 9 churches, good schools, and is the seat of Colorado College, and the State Institution for deaf-mu . It tains the offices of the Denver road, and the Colorado Coal and Iron C has water-works, gas-works, a telephone s good system of irrigation. It was founded in 1871

Colorado Potato Beetle.

Gen. W. J. Palmer, and, on account of its beauty and salubrity, has become a fashionable summer resort. Population, about 11,200.

COLOR-BLINDNESS, that is, bi to guish separate colors, must have immemorial, but no record of a fo description of the failure to 1777, when Mr. Huddart wr strated conclusively that he ld d white and black. He could name of the various colors placed efore him. not discern fruit by its color on the trees but the shape.

In 1779 a Mr. J. Scott wrote that he see colors as others see them. In 1794, English chemist, gave a description of ity to distinguish red from green, which attention at that time, so that this cl was called "Daltonism." Even after t the defect was little noticed, being cl the rare anomalies of vision. No to examine the mass of the people to tent it could be found. Only two fu reported: one in 1816 and the within the past few years has been drawn to it, and inter ine the people for the of the among them of this chro efect, and causes and effects in relation to man's dang inconveniences therefrom.

This attention arose by the overy in gating the causes of some railr ac engineers did not and could not of danger that were displayed. T

men to make general examinations of train-hands for the elucidation and explanation of some of the unaccountable accidents that had occurred upon the railroads. The discoveries were so interesting that these examinations soon extended throughout the schools to find out the ratio of defect, as well as grades of defect, among the children. Naturally, from these examinations, some general laws and classification of this peculiar visual condition have been deduced.

Prof. Holmgren, of Upsala, Sweden, was the first to go thoroughly into the examination and physiology of color-blindness. He accepts the Young-Helmholtz theory of Color-perception (see EYE in the ENCYCLOPÆDIA BRITANNICA), "That nerve-fibres in the retina are excited by waves of light, and the development of color arises from the action of longer or shorter waves upon certain fibres, producing the sensation of a color according to the length of the waves. Long waves excite fibres sensitive to red; medium, those sensitive to green, and short, those sensitive to violet." He says, "That color-blindness in each case is a genuine blindness to one of the primary colors, and therefore three classes of blindness are to be distinguished: Red-blindness, Green-blindness, and Violet blindness.

"Red-blindness is due to the absence or paralysis of the fibres or organs perceiving red, leaving but two fundamental colors, green and violet. According to Helmholtz: "Spectral red feebly excites the sensitive organs of green and less so those of violet; consequently to a red-blind person red appears a desaturate green of feeble intensity into which all the portion of the other colors enter. Feebly excited red does not sufficiently excite the perceptive elements of green in the red-blind, and it seems then Spectral yellow seems to them green and intensely luminous, and thus causing them to call all colors tints yellow." Holmgren shows that it is clear that red and green light excite one and the same element in the red-blind, and an object of these colors appear of the same color.

"Green-blindness arises from the absence or paralysis of the perceptive elements of green; leaving but two fundamental colors, red and violet. The spectrum of the green-blind is: the red appears as an extremely intense red, but somewhat less intense than the normal, which is more yellowish, as green forms part of it. Blue is violet, and violet is less intense than normal. The tints most luminous to the green-blind are orange and indigo blue, while red and green are the same color.

"Violet-blindness is due to the absence or paralysis of the elements perceiving violet, leaving the two fundamental colors red and green. To such the red is purer than normal; yellow is as a combination of the primitive colors that form white. Green is strongly luminous, but whiter; blue is a green of moderate luminosity, and violet is a feeble green. To the violet-blind red and green are not confused.

Violet-blindness is very rare, while red and green are comparatively common. The greatest number found is that of red-blind.

Holmgren has divided this chromatic defect into three grades of intensity:

1. Total color-blindness (Achromatopsia). A condition in which there is entire absence of the perception of colors. Only black and white and the different degrees of intensity of light can be perceived. Everything looks in black and white like a photograph. This grade is very rarely found congenital, but mostly follows some disease of the brain or optic nerve.

2. Complete color-blindness (Partial Achromatopsia). In which there fails the perception of one of the fundamental colors, red, green, or violet; in this group is classed red-blind, green-blind, violet-blind; and generally the congenital cases can be placed here. One born color-blind will always remain so, no matter how assiduously he attempts to educate his eye. He will not be able to see the colors in the normal way nor with the normal promptness. He does not really see the color, although he may make some kind of a distinguishment by the intensity or luminosity, and this power of distinguishing may sometimes be improved by practice.

3. Incomplete color-blindness (Dyschromatopsia). This is more frequent—this is complete "Daltonism," and consists in a reduced sensitiveness in recognizing some one or more of the fundamental colors, and especially the shades of that color, even when the primitive color may be distinguished. The perception is not so sharp and clear in certain shades as in others. This grade of defect can be very greatly remedied by education.

Magnus, of Breslau, has added a fourth grade of color defect, which he calls "Dullness or sluggishness of color distinction" (Farbenträgheit). This defect is characterized by the person first sorting out colors, by laying many shades of different colors together, just as he would do if color-blind; but, on examining them again to see if correct, the mistake is noticed and they are re-sorted correctly. In such cases the color perception, though slow, is otherwise normal.

Of the examinations now made throughout the world, in the schools and in the railroads, about 3.5 per cent. of males are born color-blind, while in females only about 1 per cent. has been found.

To the red and green-blind, black, white, yellow, and blue are generally clear and distinct, and seen as others see them. The red-blind person sees lower-tone red shades up to crimson, in yellowish tints; and then a gray or colorless hue presents itself in the brighter or higher tones of crimson. When the red shade runs into a lake, a bluish tint comes on, and increases in value as the red runs into violet. With the green-blind, the green when pure is invisible, and appears gray; but when it is mixed with yellow or blue (as most greens are), the patient sees those elements only.

A violet-blind person will lose the yellow in reds and the blue in greens, according to the shade of the violet, whether on the yellow or bluish order, so that a reddish-violet will look clear, sharp red, and a bluish-green will be a clear, distinct green. But if the violet is feeble in tone it becomes black.

For the more thorough study of color-perception and color-blindness, consult especially Helmholtz' *Physiologische Optik* (1867), Kaiser, *Compendium des Physiologische Optik* (1872), Holmgren, *De la Cécité des Couleurs*, etc. (1877), *Translation by the Smithsonian Institute* (1878), Jeffries, *Color-blindness, Its Danger and its Detection* (1879), Cohn, *Studien über Farbenblindheit* (1879), etc. (P. D. K.)

COLTON, CALVIN (1789–1857), an American minister and author, was born at Longmeadow, Mass., in 1789. He graduated at Yale College in 1812, studied theology at Andover, and was ordained in 1815 as a Presbyterian minister at Batavia, N. Y. On account of the failure of his voice he gave up preaching in 1826, and became a contributor to the press. In 1831,

after having travelled through the United States, he went to England as a newspaper correspondent. During his residence there he published *The Americans, by an American in London*, and other books, to diffuse more correct ideas with reference to the people and institutions of the United States. Returning to New York in 1835, he published *Four Years in Great Britain*, and soon after an anonymous work called *Protestant Jesuitism*, attacking the course of some prominent religious societies. His next work, *Thoughts on the Religious State of the Country, and Reasons for Preferring Episcopacy*, published in 1836, was occasioned by his change of church relation. After 1838, for several years, political subjects chiefly occupied his attention, and his writings were considered a valuable aid to the Whig party. He opposed the abolition of slavery, which then began to be urged by the Liberty party, and favored the colonization movement. His *Life and Times of Henry Clay* was prepared with the sanction and assistance of that great statesman, and published in 1845. In the same year Colton wrote *The Rights of Labor*, and in 1848 a larger work on *Public Economy in the United States*, advocating the protective system. In 1852 he was made professor of political economy in Trinity College, Hartford. He died March 13, 1857, at Savannah, Ga., whither he had gone on account of failing health. His last literary labor was connected with his complete edition of the *Writings and Speeches of Henry Clay*. Mr. Colton also published *The Genius and Mission of the Protestant Episcopal Church in the United States*.

COLUMBIA, the county-seat of Boone co., Mo., is the terminus of the Columbia branch—22 miles long—of the Wabash, St. Louis, and Pacific Railroad, and is 140 miles west of St. Louis and 10 miles north of the Missouri River. It has a court-house, 2 national banks, 3 weekly newspapers, 1 monthly and 2 quarterly reviews, 7 churches, 2 female colleges (Stephens and Christian), public schools for white and for colored children. It is the seat of the University of the State of Missouri, which was founded in 1840, and has connected with it the State Agricultural College. The university has excellent buildings, grounds, apparatus, and library, while the Agricultural College has a farm, horticultural garden, and green-house, near the town. On the grounds is a fine mineral spring. The industries of the town comprise 2 flour-mills, a wagon-factory, woollen-factory, and a distillery. It is lighted with gas, and has paved and well-shaded streets. Population, 3985.

COLUMBIA, a town of Lancaster co., Pa., is on the east bank of the Susquehanna River, 81 miles west of Philadelphia, on the Pennsylvania Central Railroad, the Reading and Columbia Railroad, and the Columbia and Port Deposit Railroad. The Susquehanna River is here crossed by a bridge more than a mile long. Columbia has an opera-house, 3 banks (1 national), several hotels, 3 weekly newspapers, 14 churches, 16 public and 6 private schools. It has 2 rolling-mills, 3 foundries, 2 factories, a saw-mill, 2 grist-mills, 3 machine-shops, 2 round-houses, a stove-factory, and tannery. It has gas and water-works. It was settled in 1726 by English Quakers, and incorporated in 1814. It was at one time proposed for the national capital. Its property is valued at $2,688,000, and its public debt is $140,000. Population, 10,597.

COLUMBIA, the capital of South Carolina, and county-seat of Richland co., is on the east bank of the Congaree River, near the centre of the State, in 33° 59′ 58″ N. lat., and 81° 2′ 3″ W. long. It stands about 200 feet above the river, which [illegible] by the confluence of the Broad and [illegible] and 336 feet above the sea. The C[illegible] here about 1800 feet wide, and falls 3[illegible] town limits. It is navigable from the lowe[illegible] city for steamboats, but this waterway is [illegible] A canal, six miles long, also formerly united [illegible] gation of the Congaree and the Saluda, and [illegible] canal extended from the Congaree to [illegible] These canals might be utilized so as [illegible] water-power. Four railways enter the [illegible] lotte, Columbia, and Augusta, the [illegible] the Greenville and Columbia, and the [illegible] Columbia, and Augusta. The town [illegible] square, regularly laid out, with wide [illegible] streets, the roadways being macadamized [illegible] sidewalks paved. Among the public buil[illegible] handsome granite State-house, the U. S. [illegible] and post-office, also of granite: a han[illegible] and opera-house, the court-ho[illegible] and [illegible] tiary, and the fireproof buildi[illegible] of the insane [illegible] The South Carolina Unive[illegible] fi[illegible] closed in grounds containing ab[illegible] institution, founded as the Sou[illegible] olina [illegible] 1802, has had a varied history; it [illegible] sed [illegible] and on reopening in 1866 was made a [illegible] ve[illegible] 1877 it was again closed, but in 1880 [illegible] revi[illegible] with two branches—the South Carolina [illegible] and Mechanical College, at Columbia, for wh[illegible] Claflin University, at Orangeburg, for [illegible] T[illegible] are also male and female academies and [illegible] schools, 15 in all, and 3 public schools. The [illegible] terian Theological Seminary has fine buildings, and has always had a high reputation. Columbia is noted for the beauty of its public and private grounds, squares, and drives. The State Agricultural Society has extensive fair grounds which, each November, are thronged with visitors. The city has 14 churches, 4 daily and 4 weekly newspapers, 2 national and 3 other banks, and fine blocks of business houses. The amount of business transacted annually is estimated at $2,500,000. By the census of 1880 the industries of the city comprised 52 establishments, with a capital of $141,000, and employing 293 hands. The value of the products was $842,732. This statement did not include the railroad shops, gas-works, granite-quarries, and some other industries. Columbia was founded in 1787, in pursuance of an act of the legislature, and became the State capital in 1790. In 1865, at the time of its occupation by the national army, it suffered greatly from a conflagration. Its population in 1870 was 9298, and in 1890 it was 14,508.

COLUMBIA, the county-seat of Maury co., [illegible] is on the south bank of Duck River, 45 m[illegible] of Nashville, on the Louisville and Great [illegible] Railroad, and it is a terminus of two ot[illegible] It has an opera-house, 4 hotels, 2 natio[illegible] other bank, 2 weekly newspapers, 7 chur[illegible] 7 [illegible] and 2 female colleges. Its industries [illegible] tories, manufacturing trunks, chairs, [illegible] carriages, and several flour-mills. It is [illegible] gas and has water-works. It was settled [illegible] 808. Its property is now valued at $2,500,000. Its public [illegible] is $50,000. Population, 6484.

COLUMBIA, BRITISH, has a sea-front[illegible] of [illegible] miles, without taking account o[illegible] indentations. To the S. its [illegible] parallel of 49° N. lat., [illegible] from the United [illegible] tana, Idaho, and [illegible]

See Vol. VI. p. 151 Am. ed. (p. 169 Edin. ed.).

fie the new Canadian Territories of Alberta and Athabasca, divided from it, except towards the N., by the eastern ridge and water-shed of the Rocky Mountains; north of it are parts of the old Canadian North-western Territory, the parallel of 60° N. lat. being the N. limit of the province. The western line is the ocean-front, except towards the N., where Alaska occupies a narrow strip of territory for some 350 miles. Its grand shore-line of 560 miles is greatly multiplied by minor convolutions; and it is officially stated to extend to 7181 statute miles, of which 1723 belong to Vancouver's Island, 684 to Queen Charlotte's Islands, 334 to Graham Island, and 250 to Moresby Island. There off the coast 52 islands noteworthy for their ex-

The area of the province is given as 355,999 re miles; that of Vancouver is about 12,000 e miles. Graham Island has some 1500 miles of , and Moresby about 1000 miles. The climate is mild on the coast, and though rainy it is remark-healthful. East of the Cascade Range the cli- nuch drier, and in some parts the country be- rid. The high plateaus have an intensely cold nate. The interior "Sea of Mountains" cts of excellent grazing land, with fertile le valleys; and some sections of the interior well for wheat. But in general the arable not occur in large tracts. On the coast the densely wooded; hence the cutting and imber form a leading interest. The prin- is are Victoria, the capital, on Vancouver ; limault, two miles from Victoria, and a much better harbor; New Westminster, on River, 15 miles from its mouth; Langley, on eam, 30 miles from its mouth, and acces- ge sea-going vessels; Yale, 80 miles higher and at the head of ordinary steam-navigation; Moody, with an excellent harbor on Burrard In- Nanaimo, the chief place for mining and shipping (British Columbian coal is of tertiary age, and be classed as a lignite. Even the anthracites of Charlotte Islands are of late geologic age, but are metamorphosed by heat and pressure.) Kamloops is a new Canadian Pacific railway town on Thompson River, here navigable for steamboats. Here the North Thompson and South Thompson, both navigable rivers, flow into Kamloops Lake. An easily built canal, from Shushwap Lake, at the head of the South Thompson, to the great Lake Okanagan, will add 130 miles to the present 300 miles of river accessible to the Kamloops steamboats. Kamloops is becoming the business centre of South-eastern British Columbia.

Less than one twenty-fourth of Vancouver Island is arable. The Queen Charlotte Islands have an admirable climate, though the rainfall is great. The soil is generally good, the fishery resources extensive, and timber and coal abundant and good. Of the central plateau only one acre in seventy-five is arable, and summer frosts are severe and frequent. The province imports flour from the U. S., the local supply of grain being inadequate; but that supply is rapidly increasing. Spring wheat, barley, oats, hay, potatoes, apples, turnips, and dairy products are leading articles of farm origin.

The *fisheries* of the colony are still the leading interest. In 1889 the establishments on Fraser River shipped 414,294 cases of canned salmon. There are also canneries on Alert Bay (Cormorant Island), on River's Inlet, and on the Skeena, Nass, Coquitlan, and other rivers. There is also an immense export of salted salmon in barrels.

The colonial fisheries are worth several million dollars a year. The oolichan, or eulacon (one of the species called candle-fish), is both canned and pickled for market. From this fish 10,000 gallons of oil are made annually on Nass River alone. The oil is reported to sell on the spot for $1 a gallon. A large herring fishery has been started. Herring-oil is largely shipped, and the scrap is sold in England as fish-guano.

Halibut, sturgeon, and many other fish are exceedingly abundant. One establishment on Skidegate Inlet makes large quantities of oil from the black shark. Crabs, shrimps, prawns, and clams are somewhat largely caught.

In the province 75,000,000 feet of lumber are sawn each year, but the business is yet in its infancy. Some of the largest saw and planing-mills in the world are to be found here. The red fir is an admirable and abundant ship-timber. The tideland spruce is also highly valued.

There are several tanneries and shoe-factories in British Columbia. The native hides are remarkably heavy. Vancouver Island affords a great amount of nemlock bark for tanning. Bear soap and sal soda are also articles of colonial manufacture.

British Columbian fur-seal hunting employs four steam-schooners, and a considerable number of minor vessels, including large Indian canoes. The Hudson's Bay Company still carries on business here, but has no exclusive privileges.

The gold output in 1889 was $588,923, having fallen to about one-quarter of what it was in 1864. Placer-mining is almost the only method of working now followed. A good deal of virgin gold territory remains. Cariboo, the chief mining-place, is in lat. 53°, and is 5000 feet above sea-level. Cassiar is in lat. 59°, and here the lower strata of the soil are always frozen.

On Texada Island, in the Gulf of Georgia, are valuable mines of iron now wrought for export to the U. S. There are extensive iron-foundries, boiler and machine works at Victoria.

The public lands and Pacific railway lands are subject to pre-emption by actual settlers on very liberal terms, but there is no homestead law. Lands are leased, but not sold, to cattle-ranchers, and when leased are subject to pre-emption by actual settlers.

The Canadian Pacific railway is controlled by a company who received from the Dominion Government those portions of the line already consfructed at the time of contract (valued at $27,000,000), besides $30,000,000 in money, and some 33,000,000 acres of land. The distance from Vancouver City, the W. terminus, to the terminus on the Atlantic, is 4319 miles. The highest elevation on the line is 3720 feet. About 700 miles of the line are north of lat. 53° N., and half as much north of lat. 54°.

The provincial government is presided over by a lieutenant-governor. There is an executive council, and a legislative assembly of thirty-three members. The civil establishment consists of the president of council, provincial secretary, assistant secretary, minister of finance and agriculture, chief clerk in the treasury, commissioner of lands and works, registrar of titles, school-commissioner and their subordinates. The judicial establishment consists of a chief justice, four puisne justices, an attorney-general, and a registrar.

In the Dominion Parliament the province is represented by three members in the Senate and six in the House. The lieutenant-governor is appointed and paid by the Dominion.

The population in 1890 was about 123,000, including 80,000 whites, 35,000 Indians, and 8000 Chinese. The white inhabitants of the province are largely to be found in the cities, of which Victoria, the capital, has 22,500; Vancouver City, 14,000 (six years ago only a saw-mill existed here); New Westminster, the seat of the Fraser River salmon industry, 8000; and Nanaimo, the coal-shipping point, 8000. The Indians of British Columbia are, as a rule, law-abiding and industrious. The coast Indians live largely by hunting and fishing, and prove very serviceable in the lumbering and salmon-canning industries.

Education in the province is compulsory, and free to all children between the ages of seven and twelve. There are both Catholic and Protestant colleges.

British Columbia is never likely to become important as an agricultural country, though there is a considerable area of arable and pasture land on Vancouver Island and in the valley regions of the mainland, of which latter the rich valley of the lower Fraser, or the New Westminster district, is the largest compact agricultural area. Of the total area of the country only about 500,000 acres are yet occupied, though this can be greatly widened in the future. The fruit-growing industry is expected in the time to come to be of considerable importance, but at present is still in its infancy.

The principal industries, indeed, must long remain those of mining, fishing, and lumbering, but these are of large and growing value. The minerals are numerous, and some of them of high promise. They include gold, silver, coal, iron, copper, galena, mercury, platinum, antimony, bismuth, molybdenum, plumbago, mica, and various others. Copper is very widely distributed. The total value of the gold product to date is over $50,000,000. All this has come from the alluvial deposits, the quartz mines having scarcely been touched. The coal mines of Vancouver Island are the most valuable yet developed on the Pacific coast, and large shipments are made from them to San Francisco and other Pacific ports. The coal mined in 1889 was 579,830 tons, of which four-fifths was exported. Nanaimo, the civic centre of the coal district, is connected by railroad with Esquimalt, near Victoria, the head-quarters of the Pacific squadron. Iron is found in many localities. The fisheries are of the highest value, important food-fishes swarming everywhere, though as yet only the salmon fishery has been developed. Of the value of the lumbering industry we have already spoken. In addition to the immense forests of fir and spruce, the timber includes yellow cypress, maple, and other valuable trees, of high future promise.

Among the recent important developments of British Columbia is a new line of mail steamers to China and Japan, subsidized by the British and Dominion governments, now in operation. There is also a project entertained of laying a telegraph cable from Columbia to the Asiatic shores of the Pacific. The revenue of the province for the year ending June 30, 1890, was $924,691; expenditure $910,611. The imports in 1889 were $3,763,127; exports in same year $4,334,306.

COLUMBIA COLLEGE, the oldest, wealthiest, and most important institution of learning in the city of New York, was founded in 1754. The founding and endowing a college in New York appear to have been in contemplation as early as A. D. 1703, but various circumstances delayed the carrying out of the scheme for half a century. In 1754 the charter of King's College, as it was then called, passed the seals, and in the next year a liberal grant of land was made by Trinity Church. Moneys had been previously raised under the authority of acts of the legislature passed in 1746. In the interval arrangements had been made for the establishment of a college; and on the 17th of July, 1754, the Rev. Dr. Samuel Johnson of Connecticut, who had been invited to be the first president, began the instruction of a class of eight students in the vestry-room of Trinity Church. The existence of the college, however, is properly to be dated from the 31st of October in the same year. On that day the charter was signed. It named as governors the archbishop of Canterbury, the first lord commissioner for trade and plantations, the lieutenant-governor, the judges, and the great officers of the colony, together with four-and-twenty of the principal gentlemen of the city. The college continued under the wise government of these gentlemen until the beginning of the war of the Revolution, when its buildings were taken for a military hospital, its students were dispersed, and its library and apparatus scattered. In 1784 it was, at its own request, erected into a university, but this arrangement continued only for three years. In 1787 the original charter was revived, with such modifications as had been rendered necessary by the change of government; and, with a body of trustees composed, as before, of the first gentlemen of the State, it entered, under the name of Columbia College, upon a new career of usefulness.

The college building was opened in May, 1760. It was thus described by the Rev. Dr. Burnaby, who saw it a year or two before: "The college, when finished, will be exceedingly handsome. It is to be built on three sides of a quadrangle fronting Hudson's or North River, and will be the most beautifully situated of any college, I believe, in the world. At present only one wing is finished, which is of stone." The beauty of the situation is also spoken of in a paper believed to have been written by Dr. Cooper: "The college stands on a dry gravelly soil about one hundred and fifty yards from the banks of the Hudson River, which it overlooks." The laying out of new streets from time to time had brought the college into the very middle of the town, and dwellings and warehouses had surrounded it long before the exigences of commerce had demanded its very site. The building was never completed according to its original plan. The north wing, as it was called, was indeed enlarged about 1818, but in 1857 the removal of the population to the northern part of the island, and the increasing value of the ground on which the college stood, made it necessary for it to seek a new abode. A large piece of ground on Madison avenue, between Forty-ninth and Fiftieth streets, at that time in the outskirts, but now in the very heart of the city, was selected. A new college now stands there.

Dr. Johnson, with competent assistance, carried on the college for several years; but, feeling the approach of age, he wrote to Dr. Secker, the archbishop of Canterbury, to ask him to select a proper person for his successor. Upon the recommendation of the archbishop the Rev. Myles Cooper, a fellow of Queen's Col-

lege, Oxford, an elegant scholar and a very accomplished man, came to New York in 1762. Mr. Cooper was only twenty-five years old. He was immediately made a fellow and professor in the college; he assisted Dr. Johnson for about a year in his instruction and government, and in 1763 succeeded him as president.

The affairs of the college seem now to have gone on prosperously for several years. The tastes and acquirements of the first two presidents had given it a reputation for classical learning which it has maintained to this day. Logic, metaphysics, and mathematics had also been always taught. Natural philosophy and mathematics were now taught by Dr. Samuel Clossy and Mr. Robert Harpur, the former a Glasgow, the latter a Dublin, scholar. Mr. Harpur, first as professor and afterwards as trustee, rendered good and efficient service for many years. To the suggestions and active labors of Dr. Clossy the college is indebted for the establishment of its first medical school in 1767. In consequence of the foundation of a College of Physicians and Surgeons in 1813, this school was discontinued; but in 1860 the newer institution was itself adopted as the Medical Department of Columbia College.

At the breaking out of the war Dr. Cooper made himself conspicuous, not only as an ardent loyalist, but as a violent political writer. In the latter capacity he was met and worsted by no less a person than Alexander Hamilton, at that time one of his own students. Dr. Cooper, however, betrayed neither mortification nor resentment, but, on the contrary, uniformly treated his youthful antagonist with good-humor, and even with respect. He was at last obliged to fly by night from the fury of a mob which attacked his lodgings in the college. He sailed for England in 1775, and never returned. Dr. Benjamin Moore, afterwards bishop of New York, was made temporary president.

In 1787, William Samuel Johnson, LL.D., a son of the first president of King's College, was elected president. Upon his resignation in 1800 the Rev. Charles Wharton, D.D., was chosen his successor. It does not appear from the records of the college that this gentleman ever entered upon the duties of his office; it is certain that he resigned it at the end of about seven months. He was succeeded by Bishop Moore. The bishop, however, was not expected to take an active part in the ordinary duties of the college, which consequently devolved upon the professors, Kent, Wilson, and Bowden. These were highly respectable and able men, and the college under their care went on well, increasing in reputation and in numbers. Notwithstanding the fact that in 1810 the requisites for admission were raised much higher than they had ever been before, a hundred and thirty-five students were matriculated for that year.

Bishop Moore resigned his office in 1811 to make room for some one who could devote his whole time to the college, and in the same year Dr. William Harris was made president and Dr. John M. Mason provost. The duty of the latter officer was to assist the president in the government of the college and to conduct the classical studies of the Senior class. This arrangement, however, continued for only three years. Upon the resignation of Dr. Mason in 1813 the whole government of the college again devolved upon the president.

Dr. Harris died in 1829, and in the same year William Alexander Duer, LL.D., was chosen his successor. During his presidency, on the 13th of April, 1837, the semi-centennial anniversary of the reorganization of the college under trustees of its own was celebrated.

President Duer resigned in 1842, and was succeeded by Nathaniel F. Moore, LL.D. The associations of both these gentlemen were with the old colonial families, and their high breeding and polished courtesy of bearing enabled them to make the college a school not only of learning, but of manners. Mr. Moore was an elegant and accomplished classical scholar, and had long served the college as professor of Greek and Latin. Under his kind, wise, and gentle, but at the same time strict and orderly, administration the college prospered. He was not a young man when he was made president, and in 1849 he retired at the age of seventy. He lived, however, more than twenty years longer.

The next president was Charles King, the second son of the Hon. Rufus King, at one time our minister to England. Mr. King had been the editor of *The New York American*, and was thought to be an accomplished literary man rather than a profound scholar like his immediate predecessor. During his administration plans for increasing the usefulness of the college which had been long in contemplation began to be carried out. After the removal of the college in 1857, additional professors were appointed, the course of instruction was enlarged and applied to men who had taken their bachelor's degree, the Law School was established, the Medical Department added, and the School of Mines begun. For the suggestion of the first two and the last of these the college was indebted to Mr. William Betts, a graduate of the year 1820. In 1840 he was made a trustee, and in 1848 professor of law, and in 1849 was nominated for president, but he withdrew his name in favor of Mr. King. The scheme of post-graduate instruction, wise and liberal as it was, was found to be in advance of the times, and after two or three years was laid aside, and was not revived until 1880. The Law School was successful from the beginning. The fate of the School of Mines was at first doubtful.

Mr. King resigned in 1864, and the Rev. Frederick A. P. Barnard, LL.D., was chosen his successor. After his appointment the resources of the college were much increased, and were employed by the trustees in carrying out plans for enlarging the usefulness of the institution. A new college building, two hundred feet in length by sixty in breadth, was finished in 1879. A School of Mines, built in 1874, has been enlarged, and a large and elegant building for the Law School and Library has risen between the two. Pres. Barnard died in 1889, having bequeathed his estate to the college. Seth Low, LL.D., was chosen his successor. He entered upon his duties with favorable auspices and has displayed great energy and good judgment. The college was opened to women in 1888.

A School of Political Science, leading to the degree of doctor of philosophy, was founded in 1880. A full account of its design was given by its chief officer, Prof. Burgess, in the *International Review* for April, 1882. At the same time new arrangements were made for post-graduate instruction. The body of professors and instructors was also much enlarged, and new studies were added to the college course. The college now gives instruction not only in the more familiar ancient and modern languages, but also in those which have been heretofore less known, as Sanskrit, Danish, Icelandic. A department of architecture has recently been established.

The library, always an important department of the college, was always celebrated for the high character of its collections, and it has been kept up with liberality and judgment. It now contains about 115,700 volumes.

In addition to the regular purchases, collections of books have been bought or given from time to time; for instance, the mathematical libraries of Drs. Kemp and Anderson, the Italian books of Prof. Da Ponte, and the classical library of President Moore, the choice and valuable collection of old English literature made by William Alfred Jones, the late librarian, and two legacies, one consisting chiefly of early New York editions of various books from Bishop Eastburn, and a recent one of about seven thousand volumes from Stephen Whitney Phœnix, an alumnus of the college.

Columbia College now has, including its own trustees and those of the Medical School, a body of about two hundred officers of instruction and government of various ranks, and nearly sixteen hundred students in all departments.

Until the early part of the present century the college was necessarily obliged to seek foreign scholars—Gross, Kunze, Cochran, Rattoone, Wilson, Adrain—for its instructors, but the year 1825 saw its faculty composed for the first time of its own alumni. McVickar, the theologian, the philosopher, and the political economist; Moore and Anthon, classical scholars; Renwick, a thoughtful and industrious natural philosopher; and Anderson, a learned mathematician,—formed for many years a small but very competent body of instructors. Since that time many of the professors—Hackley, Schmidt, Nairne, Joy, Davies, Lieber, Short, Peck, Chandler, Rood, Burgess, Alexander, Egleston, the founder and first professor of the School of Mines, and the worthy and most capable warden of the Law School, Theodore W. Dwight—have been graduates of other colleges. Drisler and Van Amringe are sons of Columbia. Of late years the college seems disposed to return to the plan of educating its own instructors. Many of the younger teachers are men who have distinguished themselves as under-graduates. Only two presidents, the two Moores, have been chosen from the alumni.

Long lists might easily be made of alumni of Columbia College, as well as of trustees and professors, who have earned much more than a local reputation. This part of the history of the college, a very creditable part, has been well written by Mr. Verplanck in his *Address before the Literary Societies*, and by Mr. Jones in his *First Century of Columbia College*. *An Historical Sketch of Columbia College* was published by President Moore in 1844. This was reprinted, slightly condensed, with a continuation by the present writer, in the *History of the College*, which was compiled under the direction of Prof. Van Amringe in 1876. (B. R. B.)

COLUMBIA, DISTRICT OF. See DISTRICT OF COLUMBIA.

COLUMBINE. This is the common name by which the various species of *Aquilegia* are known. It belongs to the natural order *Ranunculaceæ*. The flower has five sepals, five petals, numerous stamens, and five partially united carpels. The petals are developed into long, generally more or less curved spurs, the curves usually turning inward, so that the flowers when set down with the spurs upward, bear some resemblance to five young doves feeding around a dish, and from which the common name "Columbine," is supposed to be derived (Latin, *Columba*, a dove). It is indigenous to the temperate parts of the northern hemisphere. The number of species is uncertain, as the variations are so great that botanists are scarcely agreed as to the limits. In America eight species are recognized. *Aquilegia Canadensis* is the only species found in the Atlantic States. In the Rocky Mountains *A. cærulea*, with large bluish-white flowers, is found on almost alpine heights. *A. chrysantha* and *A. flavescens* are found on lower lands south and west of Colorado. *A. Jonesii* is a small species found in Wyoming. *A. truncata* and *A. formosa* are found on the Pacific coast, and *A. brevistyla* in the extreme North-west. They provide excellent food for bees, both by their honeyed secretions and by their pollen. They add very much to the beauty of early spring scenery in America, and are favorites in garden culture, but have little other popular interest.

COLUMBUS, CHRISTOPHER. Within seven years research and discovery have thrown doubt upon the conclusions which had been established concerning two important particulars in regard to Columbus. One of these relates to the identity of the island which was his first discovery in the New World, and the other to the present resting-place of his remains.

See Vol. VI. p. 153 Am. ed. (p. 171 Edin. ed.).

To speak, first, of the latter: it is well known that he died in Valladolid, that early in the sixteenth century his remains were removed to Seville, and that between 1537 and 1540, following a request made in his will, they were again removed to the island of Santo Domingo, and placed in a crypt in the great cathedral in Santo Domingo City. In 1795, by the treaty of Basle, Spain ceded to France all her portion of the island, and, upon making the formal transfer, the Spanish officials obtained permission to remove to the cathedral at Havana the dust of the great discoverer. There is reason, however, to believe that the crypt which was then opened and the remains which were transferred were those of the son of Columbus, Don Diego. On the 14th of May, 1877, as some workmen were making alterations on the epistle side of the altar, in the cathedral at Santo Domingo, a crypt was discovered containing a metallic box, in which were human remains. The box bore an inscription interpreted to mean "The Admiral Don Luis Colon, Duke of Veragua, Marquis of Jamaica," and relating to the grandson of Columbus. Further search was then made, under the direction of the archbishop, Señor Roque Cocchia, and upon the other, or gospel side of the altar, were found two crypts, one empty, from which had been taken the remains sent to Havana, and the other containing a metallic case. This case, to the joy of the searchers, had on the outside the inscription: "*D de la A. Pr A.*," interpreted to mean: "*Descubridor de la America, Primer Almirante.*" The box was then opened, and on the inside of the cover were the words: "*Illre y Esclarecido Varon, Dn Cristoval Colon,*"—("*Illustrissimo y Esclarecido Varon Don Cristoval Colon*"). On the two ends and on the front were the letters, "C. C. A."—("*Cristoval Colon, Almirante*"). The box contained bones and bone-dust, a small bit of the skull, a leaden ball, and a silver plate two inches long. On one side of the plate was inscribed:

Ultª pte de los restos
del primr alte D
Cristoval Colon Descr

("*Ultima parte de los restos del primer Almirante Don Cristoval Colon, Descrubidor.*") On the other side was: "*U. Cristoval Colon.*"

These discoveries have been certified to by the archbishop, Roque Cocchia, and by others of Santo Domingo, including Don Emiliano Tejera, an intelligent and scholarly citizen, who, at the time, in a pam-

phlet entitled *Los Restos de Colon*, set forth all the particulars. But the Royal Academy of History at Madrid, in an elaborate report, a year and a half after the exhumation, challenged the statements made by the Santo Domingans, and opposed the conclusion that the remains of Columbus were elsewhere than at Havana. Tejera and the archbishop have since published rejoinders maintaining the accuracy of their representations.

As to the identity of the island first seen by Columbus, Captain G. V. Fox, Assistant Secretary of the Navy of the United States, during the civil war, in a paper published by the U. S. Coast Survey, in 1882, reviews the evidence, and draws a different conclusion from any heretofore commonly accepted. His paper is based upon the original journals and log-book of Columbus, published in 1790 by Don M. F. Navarrete, from a manuscript of Bishop Las Casas, the contemporary and companion of Columbus, found in the archives of the Duke del Infanta. In this the exact words of the admiral's diary are reproduced by Las Casas, for the days covering the land-fall, and extending from the 11th to the 29th of October, the landing being on the 12th. From the description which the diary gives, and from a projection of the voyage of Columbus before landing and afterward, Capt. Fox concludes that the island discovered was not either Grand Turk's, Mariguana, Watling's, or Cat Island (Guanahani), but Samana, lat. 23° 05′ N., long. 75° 35′ W. After a very careful reduction of his data, and a fair projection of all the tracks, from the discovered island to Cuba (whither Columbus next proceeded), Capt. Fox declares the weight of evidence to be greatly in favor of Samana.

COLUMBUS, the county-seat of Muscogee co., Ga., is on the east bank of the River Chattahoochee, opposite Girard and Brownville, Ala., and at the head of steam-navigation from the Gulf of Mexico, 300 miles distant, and 95 miles (136 by rail) S.S.W. of Atlanta. Columbus is on the South-western and Columbus and Rome Railroads, and a railway bridge across the river gives it communication with the Columbus and Western Railroad, and the Mobile and Girard. The rapids in the river afford valuable water-power, which is improved by a dam and is utilized in extensive cotton-factories, flour and grist-mills. The city has also iron and machine-works, engine and boiler-shops, a woollen-mill, foundries, gas and water-works, and other industrial establishments. The streets are wide and regular, and many of the residences in the city and its environs are handsome structures, with gardens and finely ornamented grounds. The city has 2 banks, 2 daily and 3 weekly newspapers, an opera-house, county-buildings, 7 public school-houses, besides private and parish schools, an academy, and a female college. It is an important point for the reception of cotton, and has a good local trade. Population in 1870, 7401; in 1890, 18,650.

See Vol. VI. p. 153 Am. ed. (p. 171 Edin. ed.).

COLUMBUS, the county-seat of Bartholomew co., Ind., is on the east branch of White River, 41 miles south of Indianapolis. It is on the Jeffersonville, Madison, and Indianapolis Railroad, which has here two branches of this road. Another railroad is in construction. Columbus has a good court-house, 4 hotels, 2 banks (1 national), 3 daily and 3 weekly newspapers, 7 churches, 5 schools. It has also a foundry, a plough-factory, flour-mills, planing-mills, and tanneries. It is lighted with gas and has water-works. It was incorporated in 1864. Population, 6705.

COLUMBUS, the county-seat of Lowndes co., Miss., is on the east bank of the Tombigbee River, 228 miles north of Mobile, on a branch of the Mobile and Ohio and the Georgia Pacific Railroad. It has 3 iron and 1 wooden bridge across the Tombigbee and Luxapalila Rivers. It has a court-house, 2 hotels, 2 banks (1 national), 3 weekly and 2 tri-weekly newspapers, 10 churches and 4 schools. It has grist and saw-mills, carriage and wagon-factories, oil-mills and a blanket-factory. It has gas and water-works, and is free of debt. Its property is valued at $1,560,000, and its yearly expenses are $15,600. It was settled in 1817, by emigrants from Virginia and Georgia, and incorporated in 1821. Population, 4552.

COLUMBUS, the county-seat of Platte co., Neb., on the north bank of the Platte River and on the Loup Fork, near its mouth, 92 miles by railroad or 80 miles by air-line W. of Omaha. It is on the Union Pacific Railroad at the junction of a branch, and is connected with Lincoln by the Burlington and Missouri River Railroad. It has a court-house, a high-school, an opera-house, 4 hotels, 2 weekly newspapers, a Masonic Hall, a hospital, 8 churches, a national bank, a State bank, a pork-packing house, rope-works and a foundry. Several bridges cross the rivers here. Columbus was settled in 1856, and incorporated as a city of the second class in 1873. Population, 3118.

COLUMBUS, a city of Ohio, capital of the State and of Franklin co., on the Scioto River, and 116 miles N. E. of Cincinnati. Lat. 39° 57′ N., long. 83° 3′ W. It is handsomely and regularly laid out, its site being a portion of the great central plain of Ohio. The city owes its existence to its position in the centre of the State, which led to its selection in 1812 as the site of the State capital. In 1813 the settlement began, and in 1814 a State-house was built. In 1817 the Legislature was removed to this town; and since that time the growth of the place has been very constant. Among the public buildings are the State-house, a noble building of limestone, in the Doric style; the city hall, the blind asylum, a State hospital for the insane, the deaf-mute institution, the Ohio penitentiary, the asylum for idiots, the State arsenal and the United States arsenal, the county buildings, and other structures, many of them of very fine architecture. Other institutions are the Ohio State University, the State Agricultural College, the Capital University (Lutheran), the Starling Medical College, the Columbus Medical College, a high-school, a children's home, two Catholic orphan asylums, an academy, an opera-house, and an Odd Fellows' Temple; there is also a well-organized system of public schools, besides Catholic parish and conventual schools. The churches are about fifty in number. The largest and finest is St. Joseph's Roman Catholic Cathedral; Trinity Episcopal Church is also noteworthy, and so are the First and Second Presbyterian Churches. The business interests are large, and are accommodated by a branch of the Ohio Canal and by nine railways: the Baltimore and Ohio, the Chicago, St. Louis, and Pittsburg; the Cleveland, Columbus, Cincinnati, and Indianapolis; the Cleveland, Mt. Vernon, and Delaware; the Hocking Valley; the Ohio division of the Indianapolis, Bloomington, and Western; the Ohio Central; the Pittsburg, Cincinnati, and St. Louis, and the Scioto Valley. The situation of the city, near the border of one of the richest coal-fields in the State, has greatly conduced to its prosperity. The city has national banks and private banks. Of its newspapers and periodicals 21 are

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weekly, 2 daily, 6 monthly, and 2 semi-monthly. The manufacturing enterprises of the city are important and varied. Furniture, railway-cars, iron castings, pipes, machinery, edge-tools, hardware, clothing, boots, shoes, farm-implements, saddlery and leather are among the leading articles produced.

The most extensive library in Columbus is the State Library, one of the largest in Ohio. The city has several well-kept squares and parks. The water supply is ample, and is on the Holly system. Population, in 1870, 31,274; in 1890, 90,398.

COLWELL, STEPHEN (1800–1871), an American merchant and economist, was born in Brooke co., Va. (now West Virginia), March 25, 1800. He graduated in 1819 at Jefferson College in Canonsburg, Pa., studied law under Judge Halleck of Steubenville, Ohio, and was admitted to the bar in 1819. After practising for seven years at St. Clairsville in that State, he removed in 1828 to Pittsburg, where he continued the practice of the law until 1836. He now turned his attention to the iron manufacture, and visited Europe to study the methods pursued. He entered upon the business for himself, first at Weymouth, N. J., and then at Conshohocken, on the Schuylkill, and pursued it for a quarter of a century through all the shifts from prosperity to adversity which were consequent upon the changes in our tariff legislation. In 1850 he attended the convention of iron-makers which met to protest against the reduction of the iron duties by the "horizontal tariff" of 1847, which had begun the prostration of this great industry. He prepared the memorial to Congress adopted by the convention, in which he warned our legislators that the price of English iron would be fixed for us by the amount of our demand and the presence or absence of our domestic competition. The prediction was fully justified by the permanent increase in price which followed the general destruction of American furnaces and rolling-mills.

Mr. Colwell had already begun to appear as an author in 1834, when he published a pamphlet on Pres. Jackson's removal of the deposits from the United States Bank. After his return from Europe he contributed articles to the *Princeton Review*, and in 1850 he published a pamphlet on *The Relative Position in our Industry of Foreign Commerce, Domestic Production, and Internal Trade.* In 1857 appeared his *New Themes for the Protestant Clergy; or, Creeds, but not without Charity; Theology, but not without Humanity; Protestantism, but not without Christianity.* In this he censured the neglect of great social questions by the Protestant pulpit, and insisted that the welfare of men in this world is as truly an object of religious interest as is their salvation for the next. The book produced a notable sensation, and reached a second edition in the following year, when he continued the discussion in his *Politics for American Christians*, and also in the supplementary matter of the translation he published of Chastel's *Charity and the Primitive Churches.* Mr. Colwell, although a devout member of the Presbyterian Church (O. S.), showed himself a severe critic of the orthodox clergy, and was answered by Mr. S. A. ALLIBONE (*q. v.*) among others.

His attention was again devoted to political economy, and in 1856 he procured the translation of Frederick List's great but unfinished work, *The National System of Political Economy*, to which he prefixed an introduction discussing the scope, the spirit, and much of the literature of the science, and justifying the criticisms of Sismondi and Gioja upon the teachings of the English school. Three years later appeared his own work, *The Ways and Means of Payment, a Full Analysis of the Credit System and its Various Modes of Adjustment.* This was his *opus magnum.* It has not received from economists generally anything like the attention which it merits by the great range of special learning it exhibits and the exhaustive analysis of the phenomena of the money-market. It might be described as the complement of Mr. Tooke's great work, *The History of Prices*, being, like that, largely occupied with the refutation of that mechanical theory of money which the English economists learned from David Hume. It now is out of print and commands a high price. In the years which preceded the war Mr. Colwell published the following pamphlets bearing on the sectional controversy then raging: *The South: the Effects of Disunion on Slavery* (1856), *The Five Cotton States and New York* (1861), *Southern Wealth and Northern Profits* (1861); also several on economic problems: *The Claims of Labor, and their Precedence to the Claims of Free Trade* (1861). In 1865 he was appointed a member of the revenue commission, and prepared for its report, submitted in 1866, several reports on portions of the subject, ably advocating the protective policy. His labors in this commission broke down his health, and obliged him to relinquish literary work, although he lived five years afterwards, and died Jan. 15, 1871. His family, in execution of his unfulfilled purpose, presented his library of political economy to the University of Pennsylvania. Upon this collection Mr. Colwell spent a large amount of money and much of the leisure of his later years. It numbers some 8000 books and pamphlets, and embraces nearly every important work on social and economic subjects which had appeared in English or French, besides many in Italian and a good number in German.

Mr. Colwell was a man of singularly modest and retiring disposition, although always prompt to defend the cause of truth and ready to take part in any work of benevolence or of public utility. He was a member of many associations for such purposes, and took a prominent part in the organized efforts to promote the moral and physical welfare of the soldiers in the War of the Rebellion. He was a devoted patriot, a genuine Christian, and a sincere friend. (R. E. T.)

COMANCHES, or CAMANCHES, a portion of American Indians, of the family, who roamed, when from the head-waters of the Colorado to those of the Arkansas Missouri, whence their exodus to Mexico. They are now confined to adjoining territories. The Comanches mads, brave and warlike, and have proved blesome to the whites. They early principally by robbing from xico. haps the most expert ho they are slow and awkward visited by the French, in 1719, ous, and dwelt in large villages, of of 140 lodges and over 4000 their numbers were estimated 10,000 to 12,000. Since then they have greatly decreased, and now number about 4000.

See Vol. VI. p. 159 Am. ed. (p. 177 Edin. ed.).

Like the Shoshones generally, they are of ure, with a tendency to corpulency of body. ignorant of agriculture, and depend for entirely on robbery and hunting, living

on flesh-food. Yet they consider fish and birds unclean, and will not eat them. They wear the breechcloth, leggins and moccasins, covered with a loosely worn buffalo-robe, or occasionally a mantle of red or blue cloth. They are very fond of ornaments, and wear many trinkets of silver. Their lodges are very frail, and their villages are frequently moved from place to place.

They have no marriage ceremony, and display little constancy, yet the ties of consanguinity are strongly felt, and revenge is taken for any injury to a relative. As to their origin they are in utter ignorance, though they claim to have come from the West. Their native name is Na-üni, or live people. Their religion consists in some crude idea of a Great Spirit, to which they add the belief that they were made by a secondary spirit, sent to earth for that purpose. They also believe in future existence, and it is their custom, on the death of a warrior, to kill and bury his horses, and burn his principal effects, for his use hereafter. Formerly his favorite wife was killed, but this custom has ceased. At a burial the females scarify their arms and legs until the blood flows freely.

In war the Comanches are fierce and courageous. They are useless as foot-soldiers, but on horseback they become virtually a part of the animal they bestride. They will swoop on their foes with terrific yells, the whole body concealed behind the horse with the exception of a single foot, and in this position will discharge their arrows over the back or under the neck of the horse with fatal accuracy. They seldom use the rifle on account of its weight, but prefer the bow and the javelin, with which they are wonderfully expert. Men are seldom taken prisoners in battle, but are nearly always killed and scalped. When captives are brought into their villages they are seldom tortured by the men, but are delivered to the women, who are adepts in the art of torment. The prisoners are not killed, but are subjected to three days of painful torments, after which they are made slaves to their captors.

The Comanches are divided into three principal bands: the Comanches proper, the Yamparacks, and the Tenewas; but they roam usually in small divisions. They were for years at war with the Osage, the Pawnee, and other tribes, and with the Mexicans. Their wars with the latter, previous to 1783, were long and bloody, but in that year a severe defeat forced them to conclude peace. They have always been turbulent and dangerous. Their first reservation was in Texas. From this they were expelled, and cherish a bitter enmity against the Texans in consequence. At a later date a portion of them were placed on a reservation on the Staked Plains. Proving unruly here, they were severely chastised in 1872, and taught the necessity of submission to the power of the whites. A considerable portion of the tribe, with some Apaches and Kiowas, is now on a large reservation, embracing some 5800 square miles, in the Indian Territory.

COMET (Gr. *κομήτης*, long-haired), a remarkable heavenly body, differing in every conceivable respect from all others. While the planets and their satellites are dense, solid, and opaque bodies, and move in orbits nearly circular, and in planes nearly coincident and always direct (from west to east), the comets, on the contrary, appear to be but bulky masses of gas, of inconceivable tenuity, possessing no solid, and, probably, no liquid matter, and of a transparency surpassing that of every known terrestrial substance, moving in orbits of every imaginable eccentricity, and in planes inclined at all angles to the ecliptic, and as often moving retrograde (from east to west) as direct.

See Vol. VI. p. 163 Am. ed. (p. 182 Edin. ed.).

Cometary astronomy, in whatever light it may be viewed, is the most mysterious and the darkest part of the science of the heavenly bodies. The highest mathematical skill and the profoundest analytical reasoning, assisted by the telescope, polariscope, and especially by the spectroscope, have been brought to bear on it with but partial success, though, with a knowledge of the perturbative effects of the planets, mathematicians, from three observed positions, have been enabled to compute their orbits, and predict their returns, with an exactness not supposed possible by the early astronomers.

To the popular mind comets are divided into two classes—the bright, with long, flaming trains, and the faint, without tails; but to the astronomer the most natural division appears to be into those that are periodic and those that are not, the former being again divided into those of short and long period, while the latter are classed as parabolic or hyperbolic. It appears, therefore, that a comet, according to the curve of its orbit, may or may not be a permanent member of the solar system. If the orbit be an ellipse, no matter how long a time may elapse between its perihelion passages, the comet belongs to the solar system; but if it be a parabola or hyperbola it cannot, as the two branches of those curves do not meet as in the ellipse. Yet, strictly speaking, a comet moving in an exactly parabolic orbit has never visited our system. Just what proportion of the comets move in ellipses has never been and probably never will be ascertained. Down to 1884 only fourteen were recognized as periodical and proved to be such, not only by a similarity of elements, but by a second return. Every few years a new one is added to the number, which, as the centuries come and go, will undoubtedly be greatly increased. The following is a partial list of periodic comets. Four others have since been added, making the number known to 1890 eighteen.

	Name.	Period in Years.	No. of Apparitions since Discovery.	No. of Observed Apparit'ns.
1	Encke's	3.30	28	22
2	Tempel's II.	5.20	1	2
3	Swift's	5.46	2	2
4	Brorsen's.	5.56	6	5
5	Winneckes'	5.64	11	6
6	Tempel's I.	6.00	2	3
7	D'Arrest's	6.39	4	4
8	Biela's north	6.59	15	7 (?)
9	Biela's south	6.63		
10	Fay's	7.41	7	6
11	Brooks' & Denning's.	8.00 (?)	0	1
12	Tuttle's.	13.78	6	3
13	Pons-Brooks'	71.37	1	2
14	Halley's	76.00	23	24

No. 11, or, comet 1880, VI., though without a doubt elliptical, has not been observed at a second return. The evidences of periodicity are, however, too strongly marked to exclude it from the list.

If there were no planets, a comet would always arrive at perihelion with a period of undeviating exactness, but in its journeys, both in approaching and receding from the sun, it passes the orbits of all the

great planets, and, sometimes, near the planets themselves, some of which exert a retarding and others an accelerating influence, thus perfectly accounting for the inequality of its periods, which vary within rather wide limits, as the following table will show: For instance, between 1531 and 1607 the period of Halley's comet was 27,811 days; between 1607 and 1682 it had 27,352 days; between 1682 and 1759 it had 27,926 days; between 1759 and 1835 it had 28,006 days. Its next perihelion passage is set down for the middle of 1910, with only 27,217 days from 1835, which is less by 26 months than that between 1759 and 1835.

As no comet, not even the largest and brightest, can be seen except while travelling through but a small part of its orbit, and, unfortunately, in that portion where the three curves, the ellipse, parabola, and hyperbola are very similar, it requires observations of a degree of accuracy seldom attainable to decide in which of the three possible orbits the comet is moving, and, if an ellipse, what is its periodic time.

A similarity of the five elements of two cometary orbits, no matter how dissimilar their physical appearances may be, is proof amounting almost to a certainty that they are different returns of the same comet. These may or may not be successive returns. The following are two interesting cases in point: in 1786 a comet was discovered by Mechain, but, having been seen for only two days, no orbit could be deduced, three positions being necessary for such a computation. In 1795 Miss Caroline Herschel discovered a comet, which was observed for three weeks, and for which a moderately fair orbit was determined. In 1805 another was discovered, and the elements of its orbit calculated, though no comparison seems to have been made with those computed for that of 1795. In 1818 the celebrated comet-seeker, Pons, found a comet, of which a long series of observations was obtained, which underwent a rigorous computation by Encke, who determined a period for it of only 3⅓ years. In comparing the elements with those of the comet of 1805, he was struck with their resemblance, which the accompanying table will show:

	1805.	1818.
	° ′	° ′
Longitude of Perihelion	147 51	144 15
" " Node	340 11	329 5
Inclination	15 36	14 48
Perihelion distance	0 378	0 353
Motion	Direct.	Direct.

At this time the only periodic comet known was Halley's, which had a period of about 76 years, and the thought that here was another, and with a period of but 3⅓ years, awakened the liveliest emotions in the mind of every astronomer. How many times has it returned? was the all-absorbing question. Were Encke's computations correct, it must have returned unobserved 2 times between 1818 and 1805, twice between 1805 and 1795, and twice between 1795 and 1786. The comet was, without hesitation, predicted to return in 1822, which was confirmed.

Another case almost as interesting may be cited. In 1790 a comet was discovered by Mechain, which was not again seen until discovered by Tuttle in 1858, having returned unobserved in 1803–17–30 and –44.

The following tables contain what is known of the 13 periodic comets, derived from the most reliable sources:

No.	Least Distance from Sun. —q.	Greatest Distance from Sun.	Eccentricity. —ε.	Inclination. —i.	Longitude of Node. —Ω	Distance of Perihelion from Node. —π—Ω or —ω
1	0.342	4.10	0.8455	12° 53′	334° 34′	183° 58′
2	1.34	4.66	0.5536	12° 46′	121° 1′	185° 7′
3	1.07	5.14	0.6563	5° 23′	296° 51′	106° 13′
4	0.62	5.66	0.8098	29° 23′	101° 20′	14° 55′
5	0.78	5.50	0.7406	11° 17′	111° 31′	168° 12′
6	1.77	4.82	0.4630	9° 46′	78° 46′	159° 23′
7	1.17	5.72	0.6278	15° 43′	146° 9′	173° 0′
8 } 9	0.860	6.19	0.7559	12° 33′	245° 52′	223° 13′
10	1.69	5.92	0.5574	11° 22′	209° 42′	209° 15′
11	0.724	7.50	0.82403	6° 53′	66° 09′	312° 1′
12	1.03	10.51	0.8210	54° 17′	269° 17′	208° 47′
13	0.777	33.41	0.95499	74° 3′	254° 6′	199° 19′
14	0.586	35.3	0.9675	162° 15′	57° 15′	112° 43′

A perfect comet (seldom seen, however) consists of four distinctive characteristics, as follows, enumerated in the order usually observed by the telescope, viz.: coma, nucleus (often called the head), tail, and envelopes. The last three are often wanting, the fourth seldom or never appearing except in very bright comets. The coma (also sometimes called the head) is the only part of a comet never absent. It is that portion first appearing in a telescope as a faint *nebulous* mass in no way distinguishable from a nebula except by its motion, which, in a short time (sometimes in a few minutes), is detected by the telescope. As it approaches the sun it gradually, and sometimes quite suddenly, assumes an oval form, the major axis lying in the direction of the sun. Soon a train of light, which, though not very appropriately named, is called the tail, is thrown out in a direction opposite the sun, which in some cases, when near perihelion, takes on gigantic proportions, especially in apparent length, and astonishing all beholders, a terror to the ignorant, and an unsolved enigma to the wise. After its perihelion passage the coma, nucleus, and tail rapidly decrease in brightness until in a few months—perhaps in a few weeks, or even days—it becomes invisible even with powerful telescopes. In approaching the sun the coma precedes the tail, but in receding from it, after perihelion, the tail precedes the coma.

The tails of comets, however they may be viewed, whether as regards their immense length, both in degrees and in miles, the separation of some into two or more parts in the direction of their lengths, their great breadth and curvature, the rapidity of their formation, their deviation from the line of the radius vector, frequent formation of a tail towards the sun, the black stripe through the centre of some, and its absence in others, their chemical composition, and, above all, the source and nature of the force that throws back from the sunny side of the coma a train of unimagined extent—in one instance 200,000,000 miles in length and 15,000,000 in breadth—are among the most inscrutable of the marvels which the visible universe presents for our contemplation and study. No explanations have ever been propounded that will satisfactorily account for a single one of these phenomena. The analysis of their light by the spectroscope, and the detection in their spectra of lines belonging to hydrogen, nitrogen, carbon, sodium, etc., go a long way to prove that they contain ponderable matter. When it is considered how rapid is the rate

of their formation (sometimes more than 15,000,000 miles per day), too rapid, it would seem, for the propulsion of matter, and too slow for the movement of electricity, we are instinctively forced to the conclusion that the power, far away as it is, and far-reaching as it must be, lies wholly in the sun, and can emanate from no other source.

Some comets have no tails; indeed, those that are telescopic rarely have them, which also is true of periodic comets of short period. Encke's is generally as round as the full moon, yet occasionally has thrown off a tail visible to the naked eye—from one to three degrees in length. Some have been seen with tails before, but not after, perihelion, and *vice versa*.

The tails of comets, though generally spoken of as being opposite the sun, are, in fact, seldom exactly so except that portion near the head: the remainder being curved, of which the comets of 1811, 1858, and 1881 and 1882 are examples. The great comets of 1843 and 1861 were examples of tails perfectly straight, and of immense apparent length. The latter, though much shorter in miles, was far longer in degrees, having reached the extraordinary length of 118°, an excess of 14° over the next longest on record.

The following table will show the immense length of the tails of some comets, and also the wide difference between their apparent and real length:

Comet.	Degrees.	Miles.
1861 II.	118	24,000,000
1618	104	50,000,000
1811 I.	25	100,000,000
1680	60	100,000,000
1843 I.	65	200,000,000

An inspection of the table indicates that the comet of 1811, with a tail of but twenty-five degrees in length, was more than four times as long in miles as was that of 1861, which more than quadrupled it in degrees. The reason is obvious. The view of the former was much foreshortened, while the latter was seen perpendicular to the line of vision.

Not infrequently comets have been observed with more than one tail, the most recent example being the secondary tail of the great comet of 1881, which, on the evening of June 26, was 55° in length. The principal tail at the time was considerably curved and in marked contrast to its mate, a long, straight, slightly widening beam of light, which could be traced to more than twice the extent of its primary. The succeeding night it was reduced in length one-half.

A curious accompaniment of some comets is a long, narrow, sharply defined black stripe extending from the nucleus to a considerable distance through the centre of the tail, and sometimes erroneously supposed to be a shadow cast by the nucleus. If, as believed by some, comets' tails are hollow, the space within the circumscribed cylinder must be absolutely devoid of matter, and, therefore, even allowing the nucleus to be solid, is incapable of casting a shadow. Moreover, to produce a shadow of uniform size, as was the case through the tail of Donati's comet, it is necessary that the sun and nucleus be of equal diameter. The largest nucleus ever observed in any comet was less than 8000 miles, and that of Donati's, at the time referred to above, was less than 1000 miles. Of course a shadow cast by so insignificant an object, as compared with the immense size of the sun, would quickly come to a point. Such a phenomenon has never yet been witnessed. And, besides, the opacity of the nuclei of comets has never been proven, but, on the contrary, the evidence is strongly in favor of their translucency, if not transparency. Their variation in magnitude conclusively shows that they are not solid. Nothing resembling a sharply defined disk, or its shadow, or even a phase, has ever been observed, and, furthermore, the larger the telescope used, and the higher the power, the smaller they appear. Again, the division into two parts of Biela's comet is convincing evidence of the truth of the position taken, for it is improbable, if not impossible, that a solid, as we understand the term, possessing cohesiveness to any great extent, should be divided into two, and only two parts, for each comet (there are certainly two of them now) exhibited a nucleus, which, by turns, was brighter than its companion.

An interesting history attaches to the great comet of 1880, which burst suddenly and unexpectedly into view in the southern hemisphere in January of that year. Its elements and general appearance so nearly resemble those of the great comet of 1843 I., whose apparition was equally sudden, as to raise the presumption that the two are identical, notwithstanding that the most reliable computation (by Hubbard) made the period of the latter 530 years. These comets, at their perihelion passages, made the nearest approaches to the sun of any yet observed. No comet at all comparable in brilliancy was seen thirty-seven years previous to 1843, and the only rational conclusion is that the comet of 1843 was a comet of long period—reasonably that of 1668, as one of the two sets of elements computed for that comet bore a very strong resemblance to it. The comet of 1843 grazed the sun's surface at the moment of perihelion passage, and its motion was so great (300 miles a second) as to cause it to pass half around the sun in less than two hours, though to complete the other half would, as before stated, require 530 years. When the comet of 1880 came with elements so similar to those of the comet of 1843 as to permit no doubt of their identity, the question arose what brought it back in 37 instead of 530 years. The answer that in 1843 it had met with great resistance in passing through the solar atmosphere, and thereby was retarded, was readily and almost universally conceded to be the true solution of a problem with which science had never had to deal. As it must have met a like resistance in 1880, it was with great plausibility argued that it would make its next appearance in much less time than 37 years—probably in 15 or 20, when it would, in like manner, suffer another retardation and another shortening of its period, and so on until, after a few returns, it must inevitably fall into the sun and cease to exist as a comet, a phenomenon without a known parallel in astronomy.

If the foregoing conclusions be true it is reasonable to suppose that the great comet of 1680, having grazed the sun almost as closely, may have met with a similar resistance, though in a less degree, and may reappear long before the assigned period of 575 years is reached.

The constant shortening of about two hours at every successive return of the periodic time of Encke's comet has been ascribed to resistance, but of the hypothetical all-pervading ether rather than of the solar atmosphere. If this decrease in its period is to

continue indefinitely, then it must ultimately find a grave in the sun.

For brevity and convenience in computation the orbit of a comet is assumed to be a parabola, and a provisional set of elements is computed from the best three positions attainable, with as long time intervals as possible. A search is then made through a list of all comets mentioned in history, to find any whose elements bear resemblance to those of the new comet. If none are found, then it is presumably visiting our system for the first time, but should there be in the list one or more with each of the five elements not too dissimilar, with direction of motion the same, then it is possible—perhaps highly probable—that they are returns of the same comet. Appearances are, however, not to be relied upon in deciding this question, as they vary greatly at different apparitions, depending upon their positions as regards the sun and earth. The limits of variation are so wide as sometimes to render a comet, which was bright at one apparition, invisible at its next return. Most of the periodic comets are seen only at alternate apparitions; a striking example being the periodic comet, 1880 VI. (Swift's), having a period of 5½ years. Its perihelion distance is greater than the earth's mean distance, and, consequently, is generally visible only when both the earth and comet are on the same side of the sun. Were its period an even five years, it would occupy the same relative position with respect to the sun and earth in 1885 as in 1880, and would be visible under like conditions, but the additional half year will cause the earth and comet to be on opposite sides of the sun in 1886, and as the comet will be 100 times less bright than in 1880 the detection of it will be hopeless.

Much speculation has been indulged in as to whether a comet ever did, ever will, or ever can fall into the sun, and, also, what the effect would be, not only upon that body, but upon the earth and the other planets. A thorough discussion of these questions would lead into speculative fields, which it seems undesirable as well as unprofitable to enter. We know little of the physical condition of comets; nothing, in fact, but what the telescope and spectroscope have gleaned from an examination of a very few bright ones. They appear, both under telescopic observation and spectroscopic analysis, to be wholly gaseous; yet such an idea is contrary to the experience of every chemist, and that no body entirely gaseous can exist in space is universally conceded. When the light from the nucleus and coma, and as much of the tail as is bright enough for the purpose, is examined by the spectroscope, it is found to be largely composed of one of the numerous forms of hydro-carbon vapor nearly or quite identical with olefiant gas ($C_2 H_4$). In the comet of 1882 I. and Wells' comet, 1881, the vapor of sodium (D of Fraunhofer's lines) was observed with great distinctness, though, for some reason inexplicable to us, only when near its perihelion. Without doubt other substances exist which future investigators in spectroscopy will be able to detect and identify as synonymous with well-known forms of terrestrial matter, and will show that comets are more complex in their physical and chemical constitution than has hitherto been supposed.

The perihelion distances of comets vary immensely. While some almost or actually graze the sun's surface, others have their perihelia at a distance equal to that of Mars, and, as will be seen below, one was nearly equal to Jupiter's distance. How many, if any, have their perihelia still farther away, it will require the great telescopes of the future to determine. The following are examples of each class, from centre of comet to sun's centre, expressed both in terms of the earth's mean solar distance and also in miles:

Great Perihelion Distances. (That of 1729 greatest known.)			Small Perihelion Distances. (1843 smallest known.)		
Year.	Earth's =1	In Miles.	Year.	Earth's =1	Miles from surface of the sun to centre of comet.
1847	2.1172	191,000,000	1680	0.0062	137,000
1855	2.1935	208,000,000	1843 I.	0.0055	71,500
1747	2.1985	209,000,000	1880 I.	0.00672	195,000
1729	4.0435	384,000,000	1882 II.	0.00806	310,000

We append also examples of small and great aphelion distances. Concerning the latter much uncertainty exists. To such an extent is this true, that it has been thought best not to insert in the table those with an assigned period of above 125 years. Some have been computed to have periods from 100,000, to 1,000,000, and even to more than 2,000,000 years. It is needless to add that these latter belong rather to the domain of romance than to that of ascertained truth.

Small Aphelion Distances. (Encke's smallest known.)		Greatest Aphelion Distances.		
Name.	Earth's=1	Name.	Earth=1	Period in Years.
Encke's	4.10	Tuttle's	10.51	13.78
Tempel's II.	4.66	Pons'=1812	33.40	71.37 (?)
Tempel's I.	4.82	Olbers'=1815	34.10	74.00 (?)
Swift's	5.14	Halley's	35.30	76.00
Winnecke's	5.50	Swift's 1862 III.	48.70	123.00

Comets intermediate between those of short and long periods.—The following comets are with a good degree of probability presumed to be periodic, though the computations have not been verified by a return:

Name.	Period in Years.	Next Return. A. D.
Westphal's 1852 II.	61.00	1913
De Vico's 1846 III.	73.00	1919
Olbers' 1815.	74.00	1889
Brorsen's 1847 V.	75.00	1922
Swift's 1862 III.	123.00	1962

The difference of the duration of visibility of comets is very great, as the annexed tables will show:

Name.	Days.	Name. (1811 longest known.)	Months.
1780 II.	3	1847 II.	8
1786 I.	3	1847 IV.	9½
1818 I.	4	1861 II.	12
1808 II.	7	1825 IV.	13
1826 III.	9	1811 I.	17

Another feature of comets, and one as mysterious and inexplicable as any, is the variation in volume of both the coma and nucleus. The following table shows the extraordinary variation of the coma of

Encke's comet, during its apparition in 1828. On Oct. 28 the coma was nearly 20,000 times larger than on Dec. 24. At its return in 1838 the variation was far more wonderful. On Oct. 9 its diameter was 278,000, while on Dec. 17 it had contracted to 3000 miles.

Date.	Diameter in Miles.	Date.	Diameter in Miles.
Oct. 28	323,000	Dec. 14	45,000
Nov. 7	263,000	Dec. 24	12,000
Nov. 30	122,000		

Examples of large Coma. (1811 largest known.)		Examples of small Coma. (1799 smallest known.)	
Comet.	Diameter in Miles.	Comet.	Diameter in Miles.
1849 II.	50,000	1799 I.	1200
1846	129,000	1807	2000
1770	203,000	1838 V.	3000
Encke's 1828	323,000	1847 V.	18,000
1835	357,000	1847 I.	25,500
1811	1,125,000		

Examples of large Nuclei. (1769 largest known.)		Examples of small Nuclei. (1798 smallest known.)	
Comet.	Diameter in Miles.	Comet.	Diameter in Miles.
1825 IV.	5100	1798 I.	28
1815	5300	1806	30
1858 Donati's	5600	1798 II.	125
1845 III.	8000	1811 I.	430
1769	28,000	1807	550

Discovery of Comets in the United States.—The first comet discovered in the United States was in 1847. Since then 24 have been discovered, 14 of the number having been found during the last 5 years, which marks the zeal with which this branch of astronomy is being prosecuted. Much of this is no doubt due to the stimulus of the prizes for their discovery offered by the Imperial Academy of Sciences of Vienna, and by Mr. H. H. Warner, of Rochester, N. Y., founder of the Warner Observatory.

The Vienna prizes which were offered for 3 years consisted of a gold medal valued at about $60, or its equivalent in money. On the expiration of the 3 years the prizes not being renewed, Mr. Warner, desirous that the search for them be not abandoned, offered for each discovery of a new comet a prize of $200 in gold. Three of the Vienna medals were awarded to a single American. Four comet discoverers have received from the latter an aggregate of $1950. Following are the names of the discoverers and the number discovered by each:—Miss Mitchell, 1; Bond, 1; Van Arsdale, 1; Peters, 1; Thatcher, 1; Brooks, 3; Wells, 1; Schaeberle, 2; Barnard, 2; Tuttle, 4; Swift, 7; total, 22. Besides these, 10 more have been discovered independently, viz.: 1 each by C. W. and H. P. Tuttle, 2 by Bond, 3 by Swift, and 4 by Van A le. The periodic accorded to Brooks is a co of short period (cloudy weather prevented a ation), which two days after discovery was found ing. of England.

a complete list of the most successful f all countries, Pons, of France, out-

Discoverer.	Total No.	Independent Discoveries.
Pons	28	5
Messier	13	2
Tempel	12	3
Winnecke	9	4
Mechain	8	2
Swift	7	3
Caroline Herschel	6	2

Connection between Comets and Shooting-Stars.—The connection between comets and shooting-stars and star-showers leads to a fascinating subject sufficiently shrouded in mystery for the exercise of the liveliest imagination. The identity of these three phenomena, or, at least, an intimate relation between them, seems well-nigh proven. Briefly and concisely as can be stated, the theory covering these phenomena is as follows:

1. The coma in its normal condition is composed of small discrete particles of matter in a solid state, to which Prof. H. A. Newton has very properly given the name meteoroids, which must in numbers exceed all human computation.

2. As the coma approaches the sun these meteoroids are drawn away from it on the sunny side by something analogous to tidal action, which is in the strictest sense a disintegrating process, and that the sun, in a way unknown to us, repels this matter back, which, flowing past the coma off into space, forms what we call the tail or train; this repulsion is, probably, of an electric nature.

3. These comets' tails never return to the coma, but each is left to pursue its individual journey round the sun in an elliptic, parabolic, or hyperbolic orbit, depending upon conditions too abstruse to discuss in a popular disquisition of the subject; this cast-off tail forms a portion of a ring which, receiving an accession at each return of the comet, eventually becomes continuous with a closed orbit.

4. Such rings, of which there are thousands—perhaps millions—can be cognizable to us only when the earth in pursuing its journey round the sun passes through them, when occurs a meteoric shower of greater or less abundance, depending on whether the earth passes through a dense portion, as it did on Nov. 12, 1799, Nov. 13, 1833, and Nov. 14, 1866, and as it will on Nov. 15, 1899, or through a section more sparse, as is generally the case.

5. These meteoroids in the coma, by the sun's excessive heat (there being no atmosphere as on the earth to absorb it), exhale, by the decomposition of their surfaces, a gas which when subjected to spectrum analysis is found to contain hydrogen and the vapors of carbon, and sodium and a few other unidentified substances. This view is supported further by a reference to the well-known fact that some solids, for instance ice, evaporate at all temperatures. No body wholly gaseous can exist in space, and the same is true of a liquid. The inexorable law of diffusion in the first, and of evaporation in the second, would soon dissipate them through space.

The nature and cause of the sun's selective repulsion—that is, why it should attract a comet as a whole and repel only a part—is a mystery too deep for explanation, and yet it seems to accord with what we see. It must not be forgotten that the smaller the particle of matter

the greater is the ratio of surface to volume, and, as electrical repulsion acts not in proportion to mass, but to surface, while, on the contrary, attraction acts in proportion to mass regardless of surface, it seems worthy of consideration as offering a possible explanation of what is observed. This view of the matter, with, perhaps, some modifications, may throw a little light upon the manner in which a comet's tail is formed, also as to what it is, and what finally becomes of it.

Over one hundred meteor streams and their radiants have been determined, but only two give rise to star-showers that attract general observation, and whose periodicities are strongly marked. They are called the August and November showers, and occur, in our age, on Aug. 9 to 11, and on Nov. 14, at which times the earth passes diagonally through the August and November rings respectively. The elements of these rings bear too close a resemblance to the comets of Swift and Tempel to be the result of chance, as indicated by the annexed table.

	August Meteoric Ring.	Comet III. 1862 (Swift's).	November Meteoric Ring.	Comet I. 1866 (Tempel's).
	° ′	° ′	° ′	° ′
Lon. Perihelion..	343 28	344 41	56 25	60 28
Lon. Node.....	138 16	137 27	231 28	231 26
Inclination.....	64 3	66 25	17 44	17 18
Per. Distance.....	0.9643	0.9626	0.9873	0.9765
Motion	retrograde.	retrograde.	retrograde.	retrograde
Period.....	120 (?) years.	123 years.	33¼ years.	33¼ years.

Comets which have Passed nearest the Earth.—No comet, as far as known, has ever come in contact with the earth or mingled its substance with our atmosphere; yet it would seem that, of the millions which have appeared during past ages which have had their perihelion distances within the earth's orbit, some of them must have made very close approaches to the earth, if, indeed, they have not actually collided with it. The nearest approach ever observed was the comet of 1770 (Lexell's), which passed, on the same day as the earth, through a point but 168,000 miles distant from that occupied by the earth five hours later, but during that time the earth had moved 327,500 miles, or a distance equal to about 1½ times the moon's distance. The comet, however, approached to within 1,400,000 miles of the earth, and subtended an angle of 2° 23′, the largest apparent diameter yet observed in any comet. It has not been seen since 1770, although an orbit was computed for it of only 5½ years, by which all the observations were satisfied. Perturbation by Jupiter is supposed to have changed its orbit to one of long period. Should it ever reappear, it is quite unlikely that it could be identified.

Number of Comets.—The number of distinct comets belonging to our system must be very great. The number visible in each year is not at all uniform, in some years not any being observed, while sometimes several will appear in a single year. In 1858 there were 8 visible, and 9 in 1846, the greatest number ever seen in any one year. In 1845, 4 were visible at one time. The average annual number for the last 30 years has been a little less than 4, or 7000 comets since the Christian era. How many have escaped detection is of course unknown. An effort has been made to arrive mathematically at the number of comets which have their perihelia within the orbit of Neptune by the following train of reasoning. It is a matter of observation that 48 comets have had their perihelia within the orbit of Mercury. Assuming that comets are equally distributed through space (a rather uncertain quantity), and that the law of increase should be as the cube of the solar distances of Mercury and Neptune respectively, the formula will stand as follows: as the cube of Mercury's distance (= 1) is to the cube of Neptune's distance (= 78), so is 48 to the number sought, or $1^3 : 78^3 :: 48 : 22{,}778{,}496$, the number of comets that are under the dominion of the sun and have their perihelia within the orbit of Neptune. If comets are equally distributed through space, no good reason can be assigned for so short a limitation as Neptune's distance; it should rather extend to the neutral point between the sun and the nearest star, say ten billion miles, or half the distance of Alpha Centauri. This would swell the number to mammoth proportions. Neither should the fundamental number be restricted to 48, for since the solar system existed the number which have made their perihelion passages within Mercury's orbit must have been many millions instead of only 48. These taken as the basis, the number would be too great to be expressed by any numerical notation comprehensible to man. Considered in the above light, Kepler's statement that "comets are as numerous as the fishes in the sea" was more truthful than metaphorical.

The Great Comet of 1882.—Seldom has a comet excited the popular mind to so high a pitch, or united in itself so many unique and important points of interest to the astronomer, as did this famous comet. It is a significant fact that during six of the twelve months of 1882 there appeared three comets that were not only visible to the unassisted eye but were seen in broad daylight, viz.: Comet 1882 I. (Wells), the comet seen close to the sun during the total eclipse in May of that year, and the one under discussion, generally called Comet 1882 II. The entire history of astronomy furnishes no instance of the successive appearance of three daylight comets. The eclipse comet, under the circumstances, could hardly be called a daylight comet, so, ignoring its claims to that distinction, and adding the very bright comet of 1881, it can be said that within a period of fifteen months the world has been treated to an exhibition of three daylight comets. Comet 1882, II., was discovered on Sept. 6, and became generally visible in the northern hemisphere after sunrise on Sept. 18, and, during that and the following day, was a conspicuous object without a telescope, and shone with a lustre probably never seen in any previous comet, although on the 18th it was only 3° from the sun. It was independently discovered by Mr. Common, of England, less than one degree from the sun, shining with intense lustre. The world is indebted to Mr. Gill, the astronomer at Cape of Good Hope, for imparting the fact that observers with separate instruments followed the close to the sun's limb, where, at 4h. 50m 5[illegible] on Sept. 17, it suddenly disappeared in the sun's face. This remarkable obser only 1½ hours before perihelion passage. sit not a glimpse of it could be obta nearly sufficient proof that Pastorff's vation of a comet on the sun's penumbral spot. A comet thr magnitude star can be seen unlikely to be seen on the large and bright, and, had

would undoubtedly have been seen (as it was carefully looked for), especially near the sun's limb, which is less bright than the central portion. The problem of the comet's orbit has caused much speculation and discussion, and the question at this writing is still unsolved. It has been supposed by many to be identical with several comets mentioned in history—notably those of 1668, 1843, and 1880—the reasons assigned being a close similarity of elements as indicated in the following table

	1668.	1843.	1880.	1882.
	° ′	° ′	° ′	° ′
Longitude of π.	277 . 2	278 18	277 23	276 14
" of Ω.	357 17	51 4	358 22	346 7
i.....	35 58	35 45	36 41	37 59
π distance.....	0.0047′ (?)	0.0055	0.067	0.081
Motion.....	retrograde.	retrograde.	retrograde.	retrograde.

Some uncertainty attaches to the elements assigned to the comet of 1668. We give the second of two sets computed for it by Henderson. However, satisfactory proof has accumulated that the above comets are not identical, but strangely enough have elements so similar as to raise the presumption to a high degree of probability that the three now pursuing the same path were originally one comet. The nucleus of the comet of 1882 during visibility underwent many and unexampled changes. Several days after its perihelion passage it began to elongate, which process continued until it was merely a line nearly 100,000 miles in length, which, at times, exhibited several condensations of light. It was even affirmed by several astronomers that it separated itself into three distinct nuclei. Three observers report having seen in the immediate neighborhood of the coma several large though faint cometary masses, which have, with a good degree of probability, been supposed to be fragments of the comet itself, thrown off probably when near perihelion by the force (analogous, it may be, to tidal action) heretofore mentioned. If they were fragments of the great comet, it marks an era which must ever be a memorable one in cometary astronomy, suggesting, as it does, the idea that all space may be filled with lost and disintegrated comets.

The above are not the only instances of more than one comet moving in a similar orbit. The great comet of 1881 had elements almost exactly like those of comet 1807, and, for a short time, was supposed to be a return of that comet. These have strengthened the theory, long entertained, that there are families of comets moving in similar orbits, which may, originally, have been a single comet.

Increase in the number of bright Comets.—This century, thus far, has been distinguished above all others, as far as human record extends, in the unexampled number of comets which have appeared eminent for size, brightness, and length of train. The following summary of the number, seen during the four preceding centuries, compared with the number seen thus far during the present one, strikingly confirms the above statement, and, in the minds of some, raises the inquiry whether our solar system, in its journey through space, is not passing through a region more thickly ewn with comets.

the 15th century 3 bright comets appeared;
16th, 4; during the 17th, 6; during the
thus far during the 19th, 15. Halley's comet appeared twice in the 17th century, and once in each of the other centuries. If all the apparitions of Halley's be deducted from this list, on the ground of its being a periodic, it appears that only ten bright comets appeared during the four hundred years preceding this century, while during the last eighty-two years fifteen have been seen, at least eight of them having never been surpassed during the historic period. Those of this century appeared as follows: 1811; 1835, Halley's; 1843; 1847; 1853; 1858, Donati's; 1861, Tebbutt's; 1862, Swift's; 1865; 1874, Coggia's; 1880, Gould's; 1881, Tebbutt's; 1882, Wells'; 1882, Finlay's; 1883, Pons-Brooks.

Nomenclature.—Much confusion exists in regard to this subject in consequence of astronomers having used different systems in their numbering. Some insist that they should in each year be numbered in the order of their discovery, using Roman numerals, as: Comet I., Comet II., etc., while others desire them to be numbered in the order of their arrival at perihelion. This double system works uncertainty and perplexity, and ought to be remedied. While no doubt can arise regarding the date of discovery of a comet, different computers may disagree about the time of its perihelion passage; one, perhaps, claiming that it occurred in the latter part of one year, and another in the beginning of the next, thus creating confusion between indexes and catalogues. It has been proposed, and for a time was adopted, that comets be named in the order of their discovery, by the letters a, b, c, etc., while they should be designated in the order of their perihelion passages by the Roman letters I, II, III, etc. This double system of numbering has many objections, and has been abandoned by some of its originators. The most correct and simple way seems to be to follow the order of their discovery. For illustration of this, one of many reasons in favor of this system is given, viz.: the famous comet of 1811 did not pass its perihelion until nearly six months after discovery. Had this six months carried the perihelion passage into the next year, how futile would have been the attempt to educate the popular or even the scientific world to the point of calling it the great comet of 1812, which the world had seen in all its glory in the autumn of 1811. There are objections to either system, but the numbering of them in the order of their discovery appears, from its simplicity, to be the most satisfactory.

For other facts concerning Comets see articles on COMETS and on ASTRONOMY in ENCYCLOPÆDIA BRITANNICA. See also an exhaustive article on Comets in *Chambers' Descriptive Astronomy*, 3d edition, which contains a complete list of all comets which have been observed, whose orbits have been computed, extending from 370 B. C. to A. D. 1875; also a catalogue of all those for which, from lack of requisite observations, no orbit could be computed. See also *Guillemin's World of Comets*, translated from the French by Glaisher, an extensive and entertaining work, Cooper's *Cometic Orbits* and Kirkwood's *Comets and Meteors*. For an elaborate discussion of the connection between comets and star showers, see articles by Prof. H. A. Newton on the "November Star Showers," in *Silliman's Journal*, May and July, 1864, and on "Shooting Stars," same journal for March, 1865. (L. S.)

COMET EYE-PIECE, a celestial eye-piece, which may be either a positive or a negative, with lenses of long focus and field-lens of large diameter; the former for obtaining a low power, the latter for securing a large field—two essentials for sweeping the heavens for telescopic comets.

A comet eye-piece should give a field of at least 1½° in diameter, which probably should be its largest limit of size, as the eye is unable to take in a field too large without roaming over it and stopping the telescope, which, in its sweeps, should be constantly though slowly moved, that no precious time need be lost.

The optical principles involved in the construction of a comet eye-piece are essentially the same as in all other celestial eye-pieces, the differences being those enumerated above—viz. lenses of low magnifying power and a field-lens (second from the eye) of large size. Such an eye-piece, if properly made and used upon a telescope of sufficient size whose aberrations are well corrected, will give a large, flat, and brilliant field.

The writer has for many years used with great satisfaction a comet eye-piece whose field-lens is two inches in diameter, and its eye-lens an achromatic. It is of the Ramsden or positive variety, and called by the maker "periscopic." It brings out very faint nebulæ and comets which are beyond the reach of such eye-pieces as are usually made.

The proper size of a field-lens depends on several circumstances. Its diameter should not be less than two inches, and probably two and a half inches is sufficiently large. To secure the best results the rack-tubes of comet-seekers should be made to allow the use of large eye-pieces—a suggestion seldom heeded by telescope-makers. (L. S.)

COMET-SEEKER, a telescope differing in no essential particular from any other except in its short focus as compared with the size of its object-glass—usually called the objective—and low magnifying power used. It is made short for celerity and ease of movement and for easy portability, and its low magnifying power secures a large area of field. This instrument may be either a refractor or reflector, and may be mounted either equatorially or altazimuthly as the observer desires, the latter mounting being the least expensive. Each method has its advantages and disadvantages. If mounted equatorially, it is very difficult to sweep near the poles, and if altazimuthly, equally so to sweep near the zenith. The equatorially mounted comet-seeker with divided circles, and accurately adjusted to the latitude of the place of observation, possesses, however, one great advantage over the other, inasmuch as the position of a new comet can be easily, quickly, and exactly determined. This is important, as its place thus early ascertained can be used with two others subsequently obtained for computing the elements of its orbit.

The aberrations in an objective, which the skill of the optician has as yet been unable to correct, called the "secondary spectrum" and also "irrationality of the spectrum," is governed in amount by the size of the objective alone, and not by its focal length. All refracting telescopes for all purposes could be made short were it not for this secondary spectrum, to get rid of which, as far as possible, refracting telescopes to be used with high powers are made long—usually about sixteen times their apertures. The longer the focus, the larger will be the image of the object to be magnified by the eye-piece; and, the secondary spectrum remaining the same, whether of short or long focus, it is plain that a large image requires less magnifying than a small one to get the same magnification of the object, and, of course, the secondary spectrum is magnified less, and in the same ratio is less obtrusive. With comet-seekers, however, where high powers are never used, the aberrations are not sufficiently magnified to be generally noticeable. The powers commonly used range from 15 to 35 diameters.

To secure that important desideratum, a large field, an eye-piece called a "comet eye-piece" is used. It must be remembered that the size of an object-glass does not, as many suppose, determine the size of the field of view. Other things being equal, a small glass gives the same sized field as a large one.

A new and, in many respects, improved comet-seeker is coming into use. Its mechanical construction is so simple that the following brief description will cause it to be understood: The tube is elbow-shaped, and divided into two equal lengths joined at the middle at an angle of 45°. At this junction is a prism or plain reflector placed at the same angle. At one end of the horizontal tube is the eye-piece, and at the opposite end of the perpendicular tube is the object-glass. To the horizontal tube is attached a handle for rotating the telescope, the object-glass sweeping the heavens from horizon to zenith while the observer sits at his ease looking constantly in a horizontal direction into the telescope. It possesses the advantage of ease and comfort to the observer, though attended by the loss of some light by reflection from the mirror. (L. S.)

COMFORT, GEORGE FISK, an American educator and writer on æsthetics, was born at Berkshire, N. Y., Sept. 20, 1833. He graduated at Wesleyan University, Conn., in 1857, and taught the natural sciences at Amenia Seminary, N. Y., and Fort Plain Seminary, N. Y. In 1860 he went to Europe, and spent five years in travel, studying critically the educational systems, universities, art-schools, and museums of various countries, and giving special attention to philology, archæology, and the history of the fine arts. In 1865 he was chosen professor of modern languages and æsthetics in Allegheny College, Meadville, Pa., but resigned this position in 1868 to devote himself to literary work. In 1869 he took an active part in organizing the American Philological Society, and was its secretary till 1875. In 1869 he assisted in establishing the Metropolitan Museum of Art in New York, and was a trustee and a member of the executive committee of this institution until 1872, when he removed to Syracuse, N. Y., to accept the chair of æsthetics and the modern languages in the Syracuse University. In 1873, through his efforts, a college of fine arts was established in this university, and he has been dean of this college since its opening. Its success has proved the wisdom of the innovation of placing the fine arts on a basis co-ordinate with that of the classics and the sciences in American universities. Prof. Comfort is a member of the archæological institutes of Rome, Paris, and Berlin, as well as of learned societies in America. He has contributed to various encyclopædias, magazines, and reviews, as well as to the daily and weekly press. He has delivered many lectures, chiefly upon topics connected with artistic culture and education. He has published *Æsthetics in Collegiate Education* (1867); *Art-Museums in America* (1870); a series of text-books for the study of the German language; *Fine Arts in Collegiate Education* (1875); *The Land Troubles in Ireland* (1881). He is also joint author with his wife of *Woman's Education and Woman's Health* (1875).

COMMINATION, a penitential service in the Church of England, used on the first day of Lent. It is defined in the Book of Common Prayer as a denouncing of God's anger and judgment against sinners. It is a relic of the penance which for centuries after the Christian Church was fully established was required of those who had been convicted of grievous sins. These persons, when seeking restoration to the Church, came fasting and clad in sackcloth and ashes; after the per-

itential psalms were pronounced they were cast forth from the Church as unworthy of being admitted to the congregation. Again and again they came as before, and only after a long trial and ample proof of penitence were they by degrees admitted into participation in the services. At the time of the Reformation such practice had long been extinct. In compiling the English Book of Common Prayer the present office was introduced to take the place of the former custom of marking the people with ashes on the first day of Lent. Martin Bucer, the German Reformer, who examined the English Prayer Book, approved the service, and at his suggestion it was directed to be used "at divers times in the year." Practically, it is never used except on Ash Wednesday, and the American Episcopal Prayer Book in the service for that day has omitted the Commination.

COMMONS.—The continuity in America of the old English or Germanic system of land community is an interesting fact, which serves to connect American communal life with the earliest beginnings of Teutonic society.

See Vol. VI. p. 186 Am. ed. (p. 208 Edin. ed.).

According to Tacitus, the ancient German communities took up land in proportion to the number of cultivators. These lands they afterwards divided among themselves, according to their rank or position in the community. He says they changed the situation of their plough-lands every year, while the remaining land was left common. This pictures historically the agrarian status of most Teutonic village communities as regards their communal domain. Doubtless the early Germans owned their house-lots in severalty, and doubtless they gradually acquired individual farms by allotment and consolidation, but for a long period, in a new or thinly-populated country, there would remain vast outlying tracts of common land. The village domain within the forest-clearing was the mark. This, itself, although subdivided and owned to a great extent in severalty, had certain communal characteristics. It was the collective domain of the village. It had common open spaces, of which village-greens, streets, and foot-paths are modern survivals. Without such forms of land community, no local society could exist without perpetual trespass upon individual rights. In addition to such fundamental commonage, Teutonic villages have been accustomed, down to recent times, to one or more of the following rights, called commons: to common wood in the surrounding forest, to common pasture, and to common grass-land. These rights are known in German as *Wald*, *Weide*, and *Wiese*, or wood, pasture, and meadow. Common rights to fishery and to the use of turf were also frequently claimed. Certain features of this ancient communal system are kept up to this day in the village communities of Germany, Switzerland, and Great Britain.

In some parts of the English colonies in America, the old system was reproduced in absolute perfection. The Pilgrim fathers of Plymouth Colony, like the ancient Germans, took up a tract of land as a communal domain, and in proportion to the number of cultivators. This tract they divided among themselves, according to the size of their families. More usually, in New England settlements, the division was according to property-rights and the rank of the settlers. Very frequently, however, as in the town of Plymouth, lands, especially meadows, were allotted to heads of households, according to the size of their families. The agrarian community at Plymouth was not due to the existence of a partnership between the Pilgrim fathers and English capitalists, for the community survived the partnership. It was practically as independent of superior authority as were the agrarian communities of English tenants upon the manorial estate of their lord. Old usages went on undisturbed by colonial legislation. For many years after the founding of Plymouth upon the site of Indian corn-lands, which became the village mark, grass-lands were assigned by lot in town-meeting. For years the wood was cut and hauled in common. For more than a century the undivided forests were known as "commons." As late as 1710 Plymouth had within its communal jurisdiction over 30,000 acres of common land, and there still remain more than 200 acres of so-called "town-land," chiefly forest, whence, it is said, villagers sometimes help themselves in good old Teutonic fashion.

Survivals of the ancient system of commons, more especially of common pasture, have been traced throughout the limits of the old colony of Plymouth, and down to the very extremity of Cape Cod. In the old town of Sandwich there is still a parcel of land known as the "Town Neck." This is owned by a company of twenty-four proprietors, the descendants or heirs of the first settlers of the town, and this tract is managed to this day as a common field. Originally the Town Neck, like other common lands, belonged to the whole town. In the town records, under the date May 22, 1658, stands the following note: "If an inhabytant wanteth land to plant, hee may have some in the Towne Neck, or in the common for six yeare and noe longer." Later, in 1678, April 6, townsmen are given liberty to improve Neck lands "noe longer than ten yeares, and then to be at the townsmen's ordering againe." In the year 1695 the use of the Town Neck was restricted to the heirs of original proprietors, and the land was staked out into thirty-eight lots. The lots were not fenced off, and the whole tract continued to lie as a common field, under the authority of the entire body of proprietors, like the arable lands of a Germanic village community. In 1695, April 4, it was agreed that the Town Neck should be improved for the future as a common field, until the major part of those interested should see cause otherwise to dispose or improve the same. The common fence was to be made up, and a gate to be provided by the first of May. A field-driver or hayward was to keep the Town Neck clear of creatures, and to impound for trespass. In 1700 it was voted that the Neck be cleared of creatures by the 16th of April, and that no part of the land be improved for tillage other than by sowing.

The above case well illustrates the survival of common fields in the older English colonies. The system prevailed throughout New England, especially in Massachusetts and Connecticut. In the town of Salem there were no less than ten common fields of associated proprietors, who, by a vote of the majority, planted the same crop in their respective fields, and fenced in common. The proprietors had individual rights, but those rights were subject to communal authority. In harvest-time, by the law of the colony of Massachusetts, all artisans and common laborers could be impressed by the town constable "to worke by the day for their neighbours needing them in mowing, reaping, and inning." If any person so required by law to labor should refuse, he was compelled to forfeit, for "the use of the poor of the towne, double so

much as such a dayes worke comes unto." This was simply the revival of old English parish law. The records of the proprietary of Salem South Fields are still in existence, and contain curious evidence as to the continuity of ancient local customs. Associate tillage in the same common field was, however, only one phase of land community in New England. All three varieties of absolute commonage, wood, meadow and pasture, prevailed in Salem and in many other of the older towns. The woodland about Salem, as in ancient Plymouth, was long reserved "for the commons of the towne, to serve it for wood and timber." If a townsman needed wood for fuel, fencing, or building purposes, he could have it freely within reasonable limits, but the export of timber, boards, and clapboards was strictly forbidden, unless the same had first been offered for sale to the selectmen, or, as they were often called in Salem, "the towne representative." The town of Salem, like many others, had vast tracts of absolutely common meadow, where, as in ancient Plymouth, a place was annually appointed where every man should mow. Long after the division of the principal meadows among Salem householders, according to the size of their families, the old custom of allotting bits of grass-land to individuals for a year's tenure went on undisturbed. Throughout New England, the custom long obtained of allowing the cattle of all townsmen or commoners to feed in the meadows, after the grass crop had been gathered by individual owners. This custom survived in the older towns along the Connecticut River down to very recent times.

Common pasture, next to town commons or village greens, seems to be the most enduring feature of ancient land community. In Salem, the Town Neck, now a public pleasure-ground, continued to be used as a home-pasture for milch cows until long after the time when Salem became a city (1836). Boston Common was thus used by its residents for many generations. There are, to this day, within the city limits of Salem, 300 acres of common land, called the "Great Pastures," owned by the heirs or descendants of the original commoners. This is the last remnant of great tracts, once embracing 4000 acres, and extending over the present limits of the towns of Peabody and Danvers. Concerning this tract it was voted by the town, in 1640, that "none of the commons within the cattle-range should be granted to any individual use." But the increase of population and the claims of newcomers to the rights of commonage led, in the course of the 18th and 19th centuries, to the gradual break-up of the old system of communal land-tenure. The history of this gradual break-up shows that precisely the same questions which agitated the plebeians and patricians of Rome with regard to the *ager publicus*, long disturbed the cottagers and commoners of this little village republic. The cottagers were new-comers and landless men; the commoners were the descendants of the original proprietors of the commons. The village patricians, in all the early New England towns, yielded slowly to the demands of the *plebs*, but the struggle was everywhere long and bitter. The agrarian history of New England has never been written, but it would constitute, if properly prepared, one of the most important and suggestive chapters, for it would describe that slow-moving, economic revolution, which has resulted in the establishment of freehold land-tenure for all classes, and in a vast number of thriving communities, composed of independent proprietors, whose chief communal interests are based no longer on common lands but upon common schools.

Traces of the ancient system of land community are now cropping out in many different States of the American Union, wherever students have taken pains to investigate the history of early land-tenure. Commons existed in all early Teutonic settlements in America, whether English or Dutch. They have been noted, not only throughout New England, but upon Long Island, in Nantucket, New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and the Carolinas. The glebe lands in Southern parishes are only an ecclesiastical phase of original parish commons, set off and administered by corporate boards for church purposes, as were town lands in New England for the support of schools and clergy. The court-greens in Southern county-towns are precisely the same in principle as village greens and town commons. The old town-pasture of Annapolis has a hundred parallels in the local history of New England. The early customs of this latter section with regard to cattle-ranges and common pasture have their modern counterpart in the customs of cattle-herding in the West, and in the practices of common pasturage which still obtain in many parts of the South. Almost everywhere survive certain communal usages, often with reference to individual land-holdings, farms, plantations, estates, woodlands, swamps, and pasture. Forest and stream are still regarded, in many sections, as free to the hunter and the fisherman. Private roads and foot-paths often become common to the public. Individual proprietors are not infrequently influenced or controlled by neighborhood considerations in the management of their own land. A Mississippi planter, who wanted to turn his plantation into a stock-farm, found himself prevented from so doing by an injunction of the court, his neighbors contending that the sowing of grass-seed in a cotton district would injure plantations adjoining the proposed stock-farm. Thus, occasionally even now, the sovereignty of the community over an individual domain is recognized by law or custom in the matter of what farmers may plant.

Further information upon the subject of "Commons" may be obtained from an article in *The Nation*, January 10, 1878, by W. F. Allen, on *The Survival of Land Community in New England*, and from the *Johns-Hopkins University Studies in Historical and Political Science*, Vol. I, No. 2, on *The Germanic Origin of New England Towns*, and Nos. 9 and 10, on *Village Communities of Cape Ann and Salem*. (H. B. A.)

COMMON LAW. The ancient com of England is generally co jurists of the United S have imported hither by c constitute the b our was a well-re d d mother country "that whe a and ited country was found out j law is the birthright of every they go they carry their laws w and the such new-found country is to be gov by t of England, though after such c the English, acts of parliament n out naming the foreign plan This principle has received j own courts.

See Vol. VI. p. 186 Am. ed. (p. 208 Edin. ed.).

It must be observed

law was not imported into this country. Much of that elaborate system had relation to matters purely local, which existed under the English political organization, or was based upon the triple relation of king, lords, and commons, or upon those peculiar social conditions, habits, and customs, obtaining in the mother land. Such portions of the law were evidently unapplicable to the condition and wants of the colonists. They are therefore not recognized as part of our jurisprudence. The doctrine of benefit of clergy has, for example, been pronounced in Indiana to be "the offspring of that absurd and superstitious veneration for a privileged order in society which unfortunately existed in those ages of darkness when the persons of clergymen were considered sacred." It was therefore declared certainly not to have been adopted as the law of our country.

The doctrines of the common law with reference to poaching, with reference to the ancient methods of transferring land by livery of seisin and the like, and with reference to fencing, have all been pronounced inapplicable to this country, and are not therefore deemed to constitute any part of our jurisprudence.

The States constituting the original thirteen colonies usually fix upon the date of their settlement as that at which the decisions and statutes made and declared in England ceased, *proprio vigore*, to form part of their common law. The other States, settled since the Declaration of Independence, usually fix upon the date of the earliest permanent English settlement in this country, viz., 1607. In many instances, however, immemorial usage has sanctioned the adoption of principles which took their rise in England subsequent to the settlement of the colonies, and these principles are universally regarded as component parts of our municipal law.

It is clearly settled that it is not necessary in order to constitute a given doctrine part of our common law, that it should have been practically enunciated prior to 1607 in the very shape in which it is sought to be applied. It is sufficient if the principle involved existed in the common law prior to that date, although it was not until afterwards put into practical operation. It is accordingly held that an action for breach of promise of marriage will lie in this country irrespective of statutory provisions, although as a matter of fact no such action was ever entertained in England prior to 1607. The principles of the common law warrant such an action, and the right to bring the same was therefore unquestionably imported into this country.

In accordance with the principles which have been above laid down, English precedents prior to the settlement of this country are looked upon as of binding authority, except in so far as they are affected by the peculiar condition and requirements of our citizens. Such precedents rendered subsequent to the settlement and prior to our independence are viewed with great deference, but are not deemed absolutely conclusive. Such precedents rendered subsequent to our independence are accounted worthy of respect and attention, but have no further weight attached to them.

Those portions of the territory of the United States which have been acquired by treaty or purchase from other and civilized nations are not to be regarded as having in any manner lost by the transfer those systems of law which formerly prevailed there. Such systems remained in force until, by the proper authority, they were abrogated and new laws were promulgated. Accordingly in Florida and a great portion of the north-western territory, as well as in the trans-Mississippi territory, the French or Spanish law continued to prevail until by statutory enactment the common law was substituted.

Hitherto we have been considering the doctrines of the common law as applied in the various States. The same principles, precisely, apply in the case of the United States courts, as far as civil cases are concerned. All actions there are "according to the principles of common law and equity as distinguishod and defined in that country from which we derived our knowledge of those principles."

In criminal cases, however, a different rule attains. The United States courts have no jurisdiction in such cases except that which is expressly conferred upon them by statute. All purely common law offences are not cognizable by them. But it is not to be doubted that the Constitution and laws of the United States were framed in reference to the existence of the common law. In many cases their language would be inexplicable without reference to it. Constant resort has therefore to be had by the courts of the United States in criminal cases to the doctrine of the common law in order to fix and ascertain their powers. Wherever an authority is once lawfully given them, the nature and extent of that authority and the mode in which it should be exercised are governed wholly by the principles of the common law.

The common law has, of course, been materially altered both in the United States at large and in the several States by statutory enactments. It is quite impossible to give even the briefest summary of these. The attempt would expand the present article into a treatise on the distinctive jurisprudence of the United States. (L. L., JR.)

COMMON SCHOOLS IN THE UNITED STATES. The earliest schools in America were established by the citizens of towns. This seems to have been the origin of the first schools in Boston, Dorchester, Salem, Hartford New Haven, and other of the older settlements. There is evidence that previous to the formal vote of the inhabitants of a town establishing schools, they had by voluntary association and agreement employed teachers to instruct their children. The vote of the colony requiring the founding of schools usually followed the action of the towns. In Massachusetts colony the interval was seven years; in New Haven not more than three. In 1642 and 1647 Massachusetts passed laws regarding the training of children which have proved to be, in a degree, the basis of all succeeding requirements concerning education. In the former year the General Court, standing in the place of the parent and seeing "the great neglect of many parents and masters in training up their children in learning and labor and other employments which may be profitable to the Commonwealth," decreed that certain men in each town shall take account of the employments of children, and especially of their ability to read and to understand the "capital laws." The law of 1647 required every town containing fifty householders to appoint a teacher "to teach all such children as shall resort to him to write and read;" and every town containing 100 householders to "set up a grammar school," whose teacher shall be "able to instruct youth so far as they be fitted for the university." So important was the enforcement of this law regarded that the penalty for non-compliance with it was severe. At first the penalty was £5 a year. In 1671 it was doubled; in 1683 it was again

doubled, and later yet again increased. All the forfeitures were appropriated to the maintenance of the public schools. It was in reference to the makers of these laws that Macaulay, in a speech in the House of Commons in 1847, said, "Those men, illustrious forever in history, were the founders of the Commonwealth of Massachusetts; but though their love of freedom of conscience was illimitable and indestructible, they could see nothing servile or degrading in the principle that the State should take upon itself the charge of the education of the people."

The Connecticut colonies, settled by Thomas Hooker and his companions, were not behind Massachusetts, from which they emigrated, in the establishment of schools. Within three years after the first log-house was built at New Haven, a public grammar-school was opened. It appears that previous to this action a school of a more elementary character had been formed. So deep was the interest in education that in 1644 certain officers proposed that the colony make an annual contribution to aid children, of good abilities but of limited means, in attending the college at Cambridge. In November of that year the General Court ordered that "Joshua Atwater and William Davis shall receive of every one in this plantation, whose heart is willing to contribute thereunto, a peck of wheat or the value of it." Not content with these generous provisions for the education of all children, the colony established, in 1672, county grammar-schools, four in number, and endowed each with 600 acres of land.

Although a larger proportion of the children of Rhode Island than of other colonies were educated either abroad or by family-teaching in the seventeenth century, yet within two years after the settlement of Newport (Aquidneck), in 1638, a teacher was invited to the town by a vote of its freemen. The school was provided with a hundred acres of land, the income from which helped to meet the tuition fees of children unable to pay them. Like the schools of Hartford, New Haven, Boston, and other large towns, it fitted its students for Harvard College.

Before the middle of the first century of its settlement every colony in New England, with the exception of Plymouth, had made education compulsory. In Plymouth colony the earliest action taken regarding schools occurred in 1663, when the Court merely proposed to the towns that "they ought to take into their serious consideration" the employment of a school-master, to "train up children to reading and writing." Ten years later the profits of the Cape fishery were given toward the support of a public school at Plymouth. Fourteen years later an "order" was passed requiring every town having twelve families to maintain a public grammar-school.

The absence of literary interests beyond the New England boundaries was at once the cause and the result of the failure to establish the system of public schools. In Virginia, for three generations after its settlement, education suffered neglect. From 1618 to 1622 various attempts were made, both in the colony and in the mother-country, to organize free schools, and even to found a college. Large grants of land and some ten thousand dollars were given for the purpose. In 1619 the Virginia Company instructed the governor to see "that each town, borough, and hundred procured, by just means, a certain number of their children to be brought up in the first elements of literature, that the most towardly of them should be fitted for college." A free school was opened in Charles City, and one in Elizabeth City in 1642. Four years before John Harvard endowed Harvard College, by the gift of his library and of a few hundred pounds, a Virginian endowed the school at Elizabeth City by the donation of 200 acres of land, and of the "milk and increase of eight cows." The school seems to have been blessed with prosperity, for in 1649 a "fine house" stood on the land, and it possessed "forty milch kine, and other accommodations." But so slight was the attention paid to education, that the historian, Burk, asserts that "until the year 1688 no mention is anywhere made in the records of schools, or of any provision for the instruction of youth." In 1671 Sir William Berkeley, the governor for thirty-six years from 1641, wrote in reply to a question of the English commissioners: "I thank God there are no free schools, nor printing; and I hope we shall not have, these hundred years; for learning has brought disobedience, and heresy, and sects into the world; and printing has divulged them, and libels against the best government. God keep us from both." During his long term of rule Sir William did much to answer his prayer.

The cause of education, however, did not suffer so severe a tyranny as the printing-press. In less than five years after Governor Berkeley offered his notorious petition, a citizen bequeathed 600 acres, "together with ten cows and one breeding mare, for the maintenance of a free school, forever." The accession of William and Mary promoted the immigration of a race to whom religion and education were dearer than all other interests. In the sixteenth century the people of Scotland had enacted that each parish should have a school for instruction in grammar, Latin, and the principles of religion; and at a period somewhat later, had directed that the schools should be so supported by the public funds as to make education possible to the poorest child in the community. The coming of Scotchmen to Virginia, near the close of the seventeenth century, marks the real beginning of a genuine interest in public education. It resulted in the establishment of the second college founded in America.

As Maryland was first established on the territory of Virginia, its early educational history has little apart from the record of the schools of the older colony. It was not until 1694 that its first act was passed regarding education, which resulted in the establishment of free schools. Towards their support were appropriated taxes imposed on negroes and spirits imported, and on the exports of furs, skins, beef, and pork. It was not, however, till 1723 that the system thus devised was realized. At this time a board of seven visitors for each county was created. To them authority was given to purchase in each county 100 acres of land as the site of a boarding-school, and to employ masters, "members of the Church of England, and of pious and exemplary lives and conversation, and capable of teaching well the grammar, good writing, and the mathematics." By an act passed five years later they were required to teach as many poor children as the visitors should direct. Though far inferior to the school system of New England, Hildreth affirms that the provision of Maryland, for the instruction of her youth, was more liberal than that "elsewhere made in the colonies for public education."

The advantages for education provided in New Amsterdam (New York) were hardly superior to those of the Old Dominion. The stolid Dutchman cared but

little more for the training of his children in any art save that of money-getting than the Virginian. The first school was opened in 1633, and was under the control of the Dutch Church. The advance in methods of education was slow, and was not materially hastened by the transformation of New Amsterdam into an English town, in 1664. In 1659 the first "Latin schoolmaster" came to the colony. In 1702 a "free grammar-school" was partially endowed; but it was not till 1732 that a school for teaching Latin, Greek, and mathematics was incorporated. The interests of education were slighted. For many years the colony contained only two citizens of a liberal education. In 1745 the number was only fifteen. "What a contrast," exclaims William Smith, the historian of New York, "in everything respecting the cultivation of science between this and the colonies first settled by the English!" "Our schools," he laments, "are of the lowest order—the instructors want instruction; and through a long and shameful neglect of all the arts and sciences, our common speech is extremely corrupt."

Professor M. C. Tyler, the historian of American literature, has remarked that, "in spite of all outward differences, of all mutual dislikes, there was an inward kinship between the Quakers of Pennsylvania and the Puritans of New England." This kinship is in no respect more clearly indicated than in the early provision made for education. "Before the pines had been cleared from the ground," William Penn and his comrades "began to build schools and set up a printing-press." Their first school was opened in the first year of the colony, and in the sixth year a free academy was established at Philadelphia. So strong and permanent were the influences in behalf of free schools that the State of Pennsylvania is one of the few States which in their original constitution inserted a clause regarding education.

It is fitting, before considering the later development, to trace out the causes of these original differences in respect to education in the several colonies.

The general cause is, of course, to be found in the character of the colonists and in the purposes of their immigration. It is estimated that, down to the year 1640, 21,000 persons, or 4000 families, had landed in New England. Careful investigation, recently conducted by Professor Dexter, of New Haven, indicates that among these 21,000 were 100 graduates of Cambridge or Oxford University. The larger majority of these scholars were residents of Massachusetts Bay; but it is probable that throughout New England, in the 60 years from 1630 to 1690, were to be found as many university graduates as in any population of the size.

Plymouth, however, contained the smallest number. Elder Brewster was, from the date of the landing in 1620 to the arrival of the first settled minister in 1629, the only university man in the colony, and he had, by at least a year, failed to complete his course at Cambridge. In his farewell letter to the Pilgrims, John Robinson writes: "You are not furnished with any persons of special eminency above the rest." The fact that, of the entire company of a hundred of the Mayflower, only three can be traced to English homes, shows that the Pilgrims were, as has been said, of the "humble stock of English common people of indistinguishable ancestry." Of the early graduates of Harvard College, to the year 1658, only three came from Plymouth Colony. The glory of the Pilgrims lies neither in the intellectual training they enjoyed, nor in the educational privileges afforded their children, but in the simple faith and courage of their devout hearts and lives.

As the purpose leading to the settlement of the Massachusetts colonies was religious, so that which chiefly contributed to the formation of the Virginia Company was commercial. Yet, notwithstanding the worthiness of this purpose, the complaint was constant that the majority of the immigrants to Virginia were either too idle or too incompetent to earn a livelihood. To their numbers were added, by the king's special order, a hundred convicts, commonly known among the colonists as "jail-birds;" and the policy by which England rid herself of these dissolute vagabonds and criminals was, in spite of the protests of the colonists, continued. But the crowning shame and injustice was the importation of women who were stolen from English homes by authorized kidnappers, forced over the ocean, and sold as wives to the planters. A colony thus settled was not the nurse of schools and colleges. The mode of settlement also tended to foster the growth of the public school in New England, and to oppose its development in the Old Dominion. The colonists of New England settled along the coast in towns adjoining each other. Population was compact. The homes were in neighborhoods and villages. In 1650 Charlestown contained about 150 dwelling-houses. The general tendency was toward concentration. In Virginia the condition was different. Its settlers "brought with them, as a type of the highest human felicity, the memory of the English territorial lord, seated proudly in his own castle, breasting back all human interference by miles and miles of his own land." The capital of the colony, Jamestown, had only a state-house, a church, and eighteen dwelling-houses. Bancroft says that in Virginia, even in the latter part of the 17th century, "there was hardly such a sight as a cluster of three dwellings." In his history, Campbell remarks that "the Virginia parishes were so extensive that the parishioners sometimes lived at the distance of fifty miles from the parish church." In a population so scattered, no system of public schools could be formed. But the comparative compactness of the New England colonists invited the establishment and support of schools in every town.

In return for his instruction, wherever in the colonies given, the teacher received an annual salary varying from perhaps $125 to $300. It was paid in part by the town and in part by each scholar. The fee a year for a scholar was seldom less than $2, and at times more than twice this amount. Payment was made not only in money, but also in what was known as "country pay," as wood, corn, and produce. "A half-cord of good merchantable wood" seems to have been equivalent to 4 shillings and a bushel of wheat to 5. But instruction was refused to no one in consequence of his poverty. In this sense the town school was free; and for its support the town taxed its property-holders far more heavily than is now necessary to maintain the present system of public schools.

Throughout the 18th century the common schools pursued substantially the system and methods of the 17th. In the Northern colonies the system became more firmly fixed, both in statute and public sentiment, and the methods and means of instruction, especially toward the close of the century, were improved and enlarged. In the Southern provinces, however, the cause of public education languished. Notwithstanding the endeavors of Jefferson, the public

school system did not, previous to the Revolution, obtain a firm footing beyond the boundaries of the Eastern States, and even not till after the close of the civil war was its permanent standing assured by statute, and the favorable sentiment of the people of the Southern States. Even in the Northern States, if the laws were severe in requirements concerning the establishment and support of schools, as they were in New Hampshire, Massachusetts, and Connecticut, they were constantly broken. The poverty of the settlers, the unsettled condition of society caused by the frequent Indian wars, and new physical conditions, tended to minify the usefulness of the public school. New Hampshire law required that every town of a hundred families should maintain a school which should fit students for college, but the failure to observe the provision was constant; so constant that, to help remedy the evil, Phillips Exeter Academy was founded. The Constitution of North Carolina, of 1776, declared that "a school or schools shall be established by the legislature, for the convenient instruction of youth, with such salaries to the masters, paid by the public, as may enable them to instruct at low prices; and all useful learning shall be duly encouraged and promoted in one or more universities;" but the education of the people remained meagre. Georgia was among the first of the States to affirm in its fundamental law the duty of establishing free schools. This it did in the Constitution of 1777. Six years later the legislature donated 1000 acres of land to each county for the support of free schools, and in 1792 gave $5000 for the endowment of an academy in each county, besides making munificent offerings for the endowment of a university. But the isolated population and the unrepublican character of society prevented the establishment of the system of common schools. The duty of the State to education was recognized in the Constitution of Massachusetts of 1780; the law of the commonwealth provided that each town of 50 householders should maintain a school for teaching the common English branches, and of 200 householders one for fitting students for the university. As early as the beginning of the 18th century as good a system of public schools was in existence in Connecticut as in any State, and included provisions for a common school in every town of 70 families during half of each year, for a grammar school in each county, and for the support of these schools by public taxation. In 1795 the State set apart the proceeds of that portion of the Territory of Ohio now known as the Connecticut Reserve—reserved by the State when it ceded certain claims to the national domain—for a school fund, which has amounted to about $2,000,000. The first constitutional reference to public schools in New York occurred in the instrument of 1822. In the 18th century the schools of New York were of little worth. The quality of the instruction was poor, and the people showed little interest in education. Towards the close of the century, about $150,000 were yearly appropriated by vote of the legislature, towards the support of the schools, and it was required that a school be kept within the limits of at least every four miles square. In the second Constitution of Pennsylvania, that of 1790, it is ordered that "the legislature shall, as soon as conveniently may be, provide by law for the establishment of schools throughout the State, in such manner that the poor may be taught gratis." To promote education, a large tract of land was set apart for the establishment of free schools.

While the legal requirements respecting common school education were few and general, not only were they frequently evaded, but the quality of the instruction actually given seems to have been of a low order. The conditions were not favorable for the promotion of either mental discipline or of knowledge. The school-houses were few, scattered, and poor. In private houses schools were not infrequently kept. Blackboards, slates, globes, and the apparatus of the more modern school were unknown. Text-books were few. Dilworth's spelling-books, the Bible and the Psalter were chiefly used. No geography was studied till the introduction of Morse's small works, in 1786–87; no history was read, and grammar received little attention. In 1783 Webster's spelling-book was introduced, and worked a great reform in a department of knowledge in which previously there had been little uniformity. Arithmetic was taught in the "Schoolmaster's Assistant," and a few other simple treatises. To "ciphering" was the chief attention paid, and progress beyond the "Rule of Three" was deemed remarkable. Writing was also taught. But a prominent defect of the schools of the eighteenth century is found in the intellectual character, and moral, though perhaps to a less degree, of the teachers. The calling was despised, and therefore failed to attract those of the best ability. Many foreigners were engaged in American schools, and evidence indicates that they were ill qualified to instruct. Teachers were constantly changed. Men taught in the winter sessions, and in case of sessions in the summer women were employed. The compensation was relatively no greater than in the preceding century. The schools of the large towns and cities were much superior to those of rural districts. The greater compactness of population and the greater wealth and culture combined to create a demand for a broader course of study and a better quality of instruction. The grammar-schools still fitted youth for college as in the preceding century, and fitted them well. But "the country schools," which included the larger proportion of the population, a writer affirms, in 1791, "through most of the United States, whether we consider the buildings, the teachers, or the regulations, are in every respect despicable, wretched, and contemptible." President Humphrey writes of the school-house in which he sat as a pupil, at the close of the century: "The first school was taught in a barn. . . We had no school-house in our district. We met as much for play as anything, where we could find shelter. . . None of the school-houses were convenient or even comfortable. They were rather juvenile penitentiaries." President Nott thus describes the severe discipline: "It was a maxim that 'to spare the rod was to spoil the child,' and on this maxim the pedagogue acted in the school-room, and applied it for every offence, real or imaginary."

For the fifty years following the War of the Revolution, the common schools were better supported by law and public opinion than in the first half of the eighteenth century. During the war the schools suffered constant interruption. The quality of instruction also generally improved toward the close of the century. This period, down to the year 1830, was the prosperous period of academies. They were incorporated institutions, of the grade of the secondary or grammar-school, and were frequently under the care of a religious denomination. They were usually situated in the country, in towns in which the grammar

or high-school did not exist, and drew their pupils from a wide range of territory. In the South they were generally under the control of the State. In the fourth decade of the present century, however, occurred a great increase in the efficiency of the public school system. At that time, at least in the Eastern States, the system underwent modifications which gave it the form it has since retained. Among the causes directly contributing to these changes were the formation of the American Institute of Instruction, in Boston, in 1830, composed of members from all parts of the country; the influence of James G. Carter, of Massachusetts, who was the mover in advanced legislation, from 1830 to 1838; the labors of Henry Barnard, of Connecticut, in both public and private capacities; and, above all, the appointment of Horace Mann, in 1837, as Secretary of the newly created Massachusetts Board of Education. To the enthusiasm, the learning, the patience, the devoted labors of Mr. Mann the common school system, not only of Massachusetts and of New England but of the whole country, owes lasting obligations.

As States were organized out of the new territory of the Ohio and Mississippi valleys, and of the Pacific coast, the system of common schools was successively introduced into each. Although the provision for public education was made by either the constitution or the statute, yet the execution of the law was in many States dilatory and ineffective. The Constitution of Ohio, of 1802, enjoined that "schools and the means of instruction shall forever be encouraged by legislative provision;" but it was twenty-three years later that a general school law was passed. In even 1836, Samuel Lewis, appointed at that time State Superintendent, declared that he found "out of Cincinnati there were no public schools worthy the name, practically open to rich and poor, and nearly half of the organized school districts were without schoolhouses, and that not one-third of the whole number would be appraised at $50 each." But the labors for three years of the superintendent partially removed these evils, and the system of public education has become well established through the agency of the State Teachers' Association. Indiana, in its Constitution of 1816, made it the duty of the Legislature "to provide by law for a general system of education, ascending in regular gradation from township schools to a State university, where tuition shall be gratis and equally open to all." The first school law was passed in 1821, but so ineffective was it that in 1840 the schools of Indiana were inferior to those of most States. The law of 1848, providing for a system of free schools, and the law of 1855 resulted in enlarging the amount of instruction and in improving its quality. The first general school law of Illinois was passed in 1825, but it was not till 1854 and 1855 that a thorough organization of common schools was made. Above most Western States, Michigan was favored in having among the framers of its first constitution and its early legislators, graduates of the academies and colleges of the East. The Constitution of 1835 ordains the appointment of a superintendent of public instruction; devotes the proceeds of all land grants for education to educational purposes; directs that a common school be maintained in each school district for three months each year, and provides for the establishment of a State University. These provisions were at once carried into effect. The provision of the Cor [illegible] of Iowa, of 1846, relating to education, is similar to that of Michigan. The Constitution of 1857 formed a "Board of Education," which was invested with great power in respect to the management of the educational institutions supported by the State; but in 1864 the school system was reorganized by the General Assembly. The Constitution of Wisconsin, 1848; of California, 1849; of Minnesota, 1850; of Nevada, 1864, and of Nebraska, 1867, contain provisions respecting education not dissimilar to those of the instruments just cited.

Before the Civil War the common school system had not thoroughly penetrated the Southern States. In Louisiana, and in Charleston, S. C., and in the States of Kentucky and Missouri it existed, but in a feeble condition. Governor Hammond, of South Carolina, said in his message, in 1844: "The free school system has failed. Its failure is owing to the fact that it does not suit our people, our government, our institutions. The paupers, for whose children it is intended, need them at home to work." But since the close of the war the system has been introduced into every Southern State. The statute law provides for the education of all children at the public expense. Although the efficiency of the system is not as great as in many Northern States, which are at once wealthier and have a greater experience in educational matters, it has gained a firm footing, and the sentiment of the better classes is in its favor.

The administration, organization, and support of schools ultimately depend upon the legislative body of each State. In many States a Board of Education has special charge of public education, subject, however, to the control of the legislature. In each town or city is usually a committee, chosen by its citizens, who have immediate superintendency of its schools. For convenience, each municipality is frequently divided into sections called "districts," and the children living in each district ordinarily attend its schools. These geographical divisions are less frequent in cities than in the country. In some States, as Florida, each county forms a school district. Schools are in general divided into the graded and the ungraded. The basis of the division of graded schools is advancement in the studies. Three grades are commonly recognized, known as the primary, the grammar (a term that has ceased to represent the fitting school for college), and the high. The high-school prepares the student for college, or affords an education in the advanced English branches; the grammar offers the ordinary English studies; the primary provides instruction in the elements of reading, writing, arithmetic, and geography. The course in each school usually occupies four years, although usage differs not only in different States, but also in adjoining towns of the same State. Graded schools are seldom found in the rural districts. The sparse population does not permit the division of pupils into schools of different degrees of proficiency. In the ungraded school all branches may be taught. Teachers are examined in respect to their qualifications by the school committee, and their schools are inspected also by them. The changes of teachers are frequent, and, together with the irregular attendance of pupils, form a principal hindrance to the highest usefulness of the schools.

Schools for the professional training of teachers, [illegible]ly [illegible]ed normal schools, are established in every [illegible] [illegible]pt Delaware, Florida, and Nevada. In the [illegible] [illegible]ates there are no less than 207, with 1400 [illegible]s and 40,000 pupils. The larger number are

supported wholly or in part by the State in which they are located; and several are organized in connection with the school systems of cities. The course of study occupies two or three years.

For the financial support of schools, dependence is placed upon permanent funds and upon taxation. The permanent funds are mainly derived from the sale of public lands. In May, 1785, the Congress of the Confederation voted to reserve in the "western territory" "lot No. 16 of every township for the maintenance of public schools." The ordinance of 1787, concerning the government of the "territory northwest of the river Ohio," affirmed the duty of providing for education. The newer States especially, as well as Connecticut, of the older, have large funds derived from the lands thus reserved. In 1836 the United States distributed its surplus revenue among the several States, and many of them have, under the name of the "United States Deposit Fund," applied their proportion to the support of the public schools. In certain newer States and Territories 2 lots of land from the 36 in each town are reserved for the support of schools. The permanent school fund of 28 States in 1875 was $81,486,158; of 30 States in 1876, $97,227,909; of 26 States in 1877, $100,138,348; of 32 States in 1878, $106,138,348; and of 30 States in 1879, $110,264,434. The largest proportion, however, of the support of public schools is derived from taxation. Table I. represents the amount thus raised, as well as the total income, in each State and Territory in 1881, the total income for all being $88,142,088.

The annual cost of education to each scholar enrolled varies from about four dollars to more than sixteen dollars. The cost is much less than in the public schools of England of similar grade. The compensation of teachers varies as much as the cost of the education of each pupil, in the different States. The average pay of male teachers a month, in the District of Columbia, is $89; in Nevada and Arizona, $84; in California, $82; in Rhode Island, $74; in Massachusetts, $67; of female teachers in the same States, $62, $83, $68, $66, $42, $33. The smallest remuneration is afforded in Louisiana, Tennessee, South Carolina, North Carolina, and Alabama, which allow each teacher amounts varying from $27 to $19 for every month's service. Table II. presents a general view of the condition of public education in the United States.

The legal school age varies in the different States. The longest runs from 4 years to 21, the shortest from 8 to 14. There are no less than 16 different school ages. The total school population of the United States exceeds fifteen millions, of whom slightly more than one-half are enrolled in the public schools, but the average daily attendance is only about one-third of the entire school population. In a few States attendance for a certain time each year is compulsory. There are nearly 200,000 public schools, taught by nearly 300,000 teachers, about two-thirds of whom are women. In the Southern States a division of schools is made between white and colored children.

Not till the last quarter of the eighteenth century was the opinion current that girls both required and deserved an education equally with the boys. As early as 1770 the common schools of Connecticut were open to every child, but the studies of the female portion were hardly as advanced as those of the male. The Moravian school at Bethlehem, Pa., and the academy opened at Medford, Mass., in 1789, were among the first institutions designed for the superior instruction of young women, but they were of private organization. In 1784 girls in Boston were admitted only to so-called "writing schools," in which penmanship, reading, and spelling were taught. These schools were kept by the public school teachers between the forenoon and afternoon sessions of the boys' schools. Five years later, girls were admitted to certain of the public schools. But it was not till 1825 that a school for their instruction in the "higher departments of science and literature" was established. Before the close of the eighteenth century, however, provisions, though meagre, had been made in most towns for public instruction of girls, especially in the summer, in the common English branches. From 1840 to 1880 the advance in opportunities for their education was rapid. It can in general be said that at the present time the advantages afforded them in the public school are equal to those

TABLE I.

States and Territories.	Amount received from taxation.			Total income.	States and Territories.	Amount received from taxation.			Total income.
	State tax.	Local tax.	Total.			State tax.	Local tax.	Total.	
Alabama	$130,000	$128,212	$258,212	$397,479	New Jersey	$1,017,785	$724,413	$1,742,198	$1,814,447
Arkansas	111,605	77,475	189,080	710,462	New York*	2,750,000	7,393,890	10,143,890	10,890,765
California	1,490,328	1,343,306	2,833,634	3,680,161	North Carolina			352,887	698,772
Colorado		336,333	336,333	708,516	Ohio	1,515,621	5,663,326	7,178,947	8,129,330
Connecticut	215,597	1,068,205	1,283,802	1,482,025	Oregon	146,806	91,569	238,375	323,301
Delaware				147,360	Pennsylvania		7,746,931	7,746,931	8,726,724
Florida			104,530	139,710	Rhode Island	81,410	434,566	515,976	582,963
Georgia	363,677	134,856	498,533	498,533	South Carolina				452,963
Illinois	1,000,000	5,769,538	6,769,538	7,922,169	Tennessee	127,839	513,404	641,243	706,312
Indiana				4,480,306	Texas	678,603			891,235
Iowa		4,087,446	4,087,446	5,006,024	Vermont	112,671	342,161	454,832	454,832
Kansas		1,206,242	1,206,242	1,740,593	Virginia	564,795	745,701	1,310,496	1,333,984
Kentucky	741,672	384,070	1,125,742	1,194,258	West Virginia	229,814	548,762	778,576	853,466
Louisiana	250,000	177,000	427,000	486,790	Wisconsin		1,750,430		2,178,219
Maine	235,979	613,258	849,237	1,089,414	Arizona				58,769
Maryland				1,608,274	Dakota				363,000
Massachusetts		4,594,207	4,594,207	4,851,567	Dist. of Columbia		551,325	551,325	555,644
Michigan		2,796,299	2,796,299	3,645,328	Idaho				54,000
Minnesota	241,000	915,738	1,156,738	1,679,297	Montana		84,008	84,008	94,551
Mississippi	200,000	373,077	573,077	716,342	New Mexico				32,171
Missouri		2,163,339	2,163,339	4,020,860	Utah	59,706	65,793	125,499	198,976
Nebraska	88,196	824,959	913,155	1,320,449	Washington	115,323	12,286	127,609	127,609
Nevada		96,811	96,811	138,640	Wyoming				36,161
New Hampshire	437,573	76,380	513,953	586,139	Indian				251,200

TABLE II.

States and Territories.	School age.	School population.	Number enrolled in public schools.	Average daily attendance.	Average school term in days.	Annual expenditure per capita of attendance.	Number of teachers.	Amount of available school funds.	Interest on permanent funds
Alabama	7-21	422,739	176,289	115,316	80	$3.56	4,698	$2,528,950	$138,014
[illegible]	6-21	272,841	98,744	.....	.....	.....	2,169	144,875	
[illegible]	5-17	211,237	163,855	105,541	115	26.32	3,737	1,990,400	293,592
[illegible]	6-21	40,804	26,000	14,649	89	38.03	801	36,000	
nnecticut	4-16	143,745	119,381	76,028	180	17.41	3,112	2,021,346	100,612
ware	6-21	37,285	29,122	.....	153	.....	583	495,749	
ida	4-21	88,677	39,315	27,046	.....	4.25	1,095	246,900	17,962
[illegible]	6-18	461,016	244,197	149,908	.....	3.32	6,128		
[illegible]	6-21	1,002,222	701,627	425,858	149	16.61	22,133	9,247,281	624,138
[illegible]	6-21	714,343	503,855	306,301	135	12.72	13,418	9,133,606	
[illegible]	5-21	594,730	431,513	254,088	148	16.97	21,776	3,547,124	234,622
sas	5-21	348,179	249,034	139,776	117	11.69	8,208	2,467,891	280,004
lucky	6-20	553,638	238,440	149,226	102	.....	6,910	1,760,652	
isiana	6-18	271,414	62,370	45,626	100	9.41	1,584	1,130,867	45,235
ne	4-21	213,927	150,067	99,500	118	10.05	6,940	438,287	26,297
yland	5-20	319,201	158,909	79,739	.....	16.37	3,180	906,229	
achusetts	5-15	312,680	325,239	233,108	178	21.54	8,861	2,086,887	69,008
[illegible]	5-20	518,294	371,743	219,328	154	12.45	14,472	3,040,183	512,301
[illegible]	5-21	300,923	177,278	79,901	100	15.55	5,571	4,835,476	385,748
[illegible]	5-21	419,963	237,288	160,064	78	4.75	6,058	800,000	
[illegible]	6-20	723,484	476,376	219,132	100	13.79	10,447	8,950,806	936,245
raska	5-21	152,824	100,776	65,504	110	17.78	4,559	5,126,565	190,135
[illegible]	6-18	10,533	8,329	5,406	140	23.97	176	415,000	33,844
npshire	5-15	60,899	68,235	43,943	97	16.02	3,585	.....	23,253
sey	5-18	335,631	203,542	110,052	190	15.91	3,486	1,452,720	100,000
[illegible]	5-21	1,662,122	1,021,282	559,399	178	19.52	30,826	3,276,602	170,000
[illegible]	6-21	468,072	240,716	142,820	48	2.81	5,002	100,000	
[illegible]	6-21	1,063,337	744,758	468,141	155	15.68	23,970	3,795,206	244,675
[illegible]	4-20	61,641	34,498	25,196	86	12.29	1,339	610,000	48,346
lvania	6-21	1,422,377	931,749	599,057	147	11.45	21,352	.....	1,051,793
de Island	5-15	53,077	44,920	28,836	186	18.04	1,287	240,376	12,449
h Carolina	6-16	262,279	133,458	.....	73	.....	3,249		
nessee	6-21	545,875	283,468	180,509	70	3.53	6,880	2,512,500	
[illegible]	8-14	230,527	186,786	.....	73	.....	4,361	.....	44,623
[illegible]nt	5-20	99,463	74,646	49,700	124	8.99	4,419	669,087	
[illegible]	5-21	556,665	239,046	134,487	117	7.22	5,392	40,600	1,350
ginia	6-21	213,191	145,203	91,266	99	7.31	4,237	441,947	39,137
[illegible]	4-20	491,358	300,122	190,878	176	.....	9,919	2,790,214	199,354
ona	6-21	9,571	3,844	2,847	109	.....	102		
ota	5-21	38,815	25,451	.....	.....	.....	1,033		
rict of Columbia	6-17	43,558	27,299	20,730	190	19.97	460	60,385	2,577
[illegible]	5-21	7,520	6,080	4,127	150	10.38	175		
[illegible]	4-21	9,895	5,112	2,800	110	.....	177		
rico	7-18	29,255	4,775	3,150	.....	9.20	164		
[illegible]	6-18	42,353	26,772	18,682	140	7.96	565		
ington	4-21	23,899	14,754	11,275	100	11.92	443		
ming	7-21	4,112	2,907	1,920	.....	14.85	70		
[illegible]	.....	9,315	6,183	3,496	180	.....	209	1,028,630	59,609
Total	.....	15,879,506	9,860,333	5,664,356	.....	.....	289,368	$78,368,341	

that boys enjoy. In the primary and grammar grades both sexes usually attend the same school, and likewise in many high schools, although the division of high schools into those for boys and those for girls is more frequent than a corresponding division of schools of a lower grade.

The direct religious teaching given in the public school is slight. It is not permitted to exceed the reading of the Bible, prayer, and devotional singing. No sectarian instruction is allowed. In the schools of cities, in which the Roman Catholic population [illegible]re. the reading of the Bible is omitted. The [illegible] of most States require the teaching of [illegible] in only a few schools is direct instruction [illegible] in practical ethics. It is, however, usually [illegible]ered the duty of the teacher to emphasize moral [illegible]s in with intellectual discipline.

[illegible] the direct results of the public school [illegible]o be [illegible] that ninety per cent. of the [illegible] old and over can read. Illiteracy is more prevalent in the Southern States, owing to their proportionally large colored population. In several of them about one-third of those ten years of age and over cannot read. In most other States less than 5 per cent. are unable to read. In California it is 5.62; in Connecticut, 3.37; in Massachusetts, 4.24; in Minnesota, 2.63; in Ohio, 2.71; in Pennsylvania, 3.41; and in Nebraska, the lowest percentage, 1.73.

The public school system is based upon the principle that the virtue and intelligence of the people are the foundation of a Republic. The Constitution of Rhode Island affirms that "the diffusion of knowledge, as well as of virtue, among the people being essential to the preservation of their rights and liberties, it shall be the duty of the General Assembly to promote public schools, and to adopt all means which they may deem necessary and proper to secure to the people the advantages and opportunities of education." The general principles of common schools are well enunciated by a leading educator, Horace Mann: "Under our

republican government, it seems clear that the minimum of education can never be less than such as is sufficient to qualify each citizen for the civil and social duties he will have to discharge: such an education as teaches the individual the great laws of bodily health, as qualities for the fulfilment of parental duties; as is indispensable for the civil functions of a witness or a juror; as is necessary for the voter in municipal and in national affairs; and, finally, as is required for the faithful and conscientious discharge of all those duties which devolve upon the inheritor of a portion of the sovereignty of this great Republic."

The literature of the history of common school education in America is at once immense and meagre. No general work exists, though one is now contemplated. The reports of State and town committees contain a vast deal of information relating to both fact and theory, but they still remain uncollected and uncollated. Of these reports those of Horace Mann, Secretary of the Massachusetts Board of Education, 1837–1848, are specially valuable. Barnard's *Journal of Education*, which has reached its 30th volume, though somewhat defective and desultory in method, contains an immense amount of matter concerning education not only in America but also in all countries. A general index is now in preparation which will render its treasures more accessible. The annual reports of the United States Commissioner of Education, a most useful Bureau established in 1867, present valuable statistics concerning the progress and condition of education in each of the States. Several volumes relating to education in America have been published in Europe. Among them may be named Fraser's *Report on the Common School System of the United States and Province of Upper and Lower Canada* (London, 1866); Laveleye's *L'Instruction du Peuple* (Paris); *L'Instruction Publique aux Etats Unis*, by the French Commissioner, Hippeau, and the *American School System*, by F. Adams. (C. F. T.)

COMMUNISM, in America as elsewhere, is of two types. The first is the primitive, unreflective and tribal type, which characterizes the less advanced portions of the human race in every part of the world, and of which traces and reminiscences exist even among civilized races. This communism has its origin in the gradual development of society from the family (the institute of the affections) to the state (the institute of rights), a development which in most cases has been checked before reaching its goal. That rule of common ownership, which is right enough within the family, is carried over into the new community, in which it has no proper place. It corresponds to that sentiment of personal regard for the chief, as father of the kindred, which in tribal forms of society is the rudimentary anticipation of loyalty to the law and reverence for its authorized agencies.

See Vol. VI. p. 188 Am. ed. (p. 211 Edin. ed.).

The first European settlers of America came hither from communities out of which this primitive communism had been extirpated by the influence of the civil law. The nations which they represented already had accepted the institution of private property as the normal mode of ownership, and had emancipated the individual from those restraints upon his activity in the pursuit of wealth and happiness which existed in primitive society. To this fact we owe, in good part, the magnificent display of human energy which has brought the new world to its present stage of development as regards occupation and civilization. Had America been laid open to the nations of Western Europe at a time when the forms of European society were less mobile and adaptable, and the conception of property less developed, we might have seen armies conquering America from the natives, but no floods of peaceful settlers spreading the arts of peace and of civilization over the continent. "We are indebted," says Sir Henry Sumner Maine, "to the peculiarly absolute English form of ownership for such an achievement as the cultivation of the soil of North America."

But what the European settlers had escaped from at home they found in full vigor in America. When Columbus landed at San Salvador, the continent was in the hands of communists. Every American people, from the Esquimaux of the remote North to the Patagonians of the remoter South, held at least their lands in common, the nearest approach to a subdivision of land being the exclusive right of the person who planted a crop to gather the harvest, and even that existing only in some cases. And in spite of all the changes effected by European conquest, communism remains the rule of life for those of our aborigines who live in or north of the United States; and a closer study of the social arrangements in the villages from Mexico southward probably would show that this method of land tenure still perpetuates itself there also.

Dr. Lewis H. Morgan, to whose investigations in this field America owes much, divides the American aborigines into three groups, according to the stage in civilization they had reached. The first and lowest consists of those who lived by hunting and fishing, without horticulture. The third and highest includes the village Indians, who lived chiefly by the culture of the soil. The second are the intermediate group, who obtained a subsistence in both ways. The first group was found, of course, only in sparsely settled regions, from which it drew a scanty subsistence; an exception being the valley of the Columbia, that American *officina gentium*, where the abundant supply of fish supported a rather dense and not uncivilized population. The village Indians were found in Arizona, New Mexico, Mexico, and especially Central America, the population growing in density and rising to higher stages in social development the farther south the locality.

Among the tribes which lived by h
were the Ojibwas in Wisconsin, the
Perces and other tribes of the C
Blackfeet and most of the Indians
Whatever they took was thrown into
and divided each day accordi to
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Indians who lived only part
cluded the Iroquois in New Yor
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consin, the Mandans and Minn
souri, and the Maricopas and
All these built village h
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bers. This was effected by

"law of hospitality," which required that food should be set before every visitor who entered house or wigwam, at whatever hour of the day.

The community houses of the third group were pueblos of adobe or of stone. Some of these still exist and are in use in Arizona, New Mexico, the most notable being that of the Zuñis. Others remain as the monuments of a past civilization in the forests of Yucatan. Such barrack-like structures constituted the city of Mexico, at the time of the Spanish invasion. Those at Uxmal, in Central America, are the most curious and imposing of these ruined pueblos. As to the industrial economies of these village Indians, we know little more than is indicated by their common dwellings. In whatever part of the world such houses have been found, communism has been found to be the mode of life practised by those who live in them. And the Indians of the pueblos of New Mexico "still hold their lands in common, with a possessory right in each to cultivate land, so long as the individual chooses to occupy it."

The existence of an undeveloped social system among the aborigines did much to facilitate European conquest. There was no coherence among these communistic tribes, who still rested social relations on kinship and not on proximity, and therefore were incapable of large and effective organization. The nearest approach to this was the confederacy of the Aztecs, with the large dependency of conquered tribes, and that of the six nations of the Iroquois, held together by the cross organization based on community in the same *totem* or coat of arms. For similar reasons there was a great want of individuality, a great repression of personal force. Communism creates irresistible power to punish dissent or independence of opinion. And this power easily passes into the hands of a few persons, to be used by them for any purpose they may choose, however narrow and selfish their aims. The chief, the priest, the medicine man amounted to more than public opinion in such a form of society. They are able to inflict substantial annoyance, and even suffering, through the community's control of the whole property. In the last resort they will cut off the man's "pipe and water," according to the threat of the Hindoo villagers. For this reason it is felt that the destruction of the communism which exists among our Indians is necessary as a first step to their elevation to a genuine civilization. Even among the more civilized tribes, such as the Cherokees, the power of the chief over the people is found to be tyrannical and oppressive. For this reason most of the proposals which have been made for the elevation of the red man to the level of American citizenship have been accompanied by plans for the assimilation of their land tenure to that of the rest of the country. At the same time it is felt that any sudden and complete transition of this sort would be accompanied by great dangers. To prevent the land-speculators from getting possession of the Indian's holding, it is proposed further to make his lands inalienable for fifty years.

See Dr. Lewis H. Morgan's *Letters on the Iroquois*, in the *American Review* for 1847; his *League of the Iroquois* (1851); his *Ancient Society, or Researches on the Lines of Human Progress from Savagery through Barbarism to Civilisation* (New York, 1879); his paper on *System of Consanguinity and Affinity*, in the *Smithsonian Contributions to Knowledge*, Vol. XVII.; his article on *Montezuma's Dinner*, in the *North American Review* for April, 1876; his article on the *Architecture of the American Aborigines*, in Vol. I. of *Johnson's Encyclopædia*; and *The Iroquois Book of Rites*, edited by Horatio Hale (Philadelphia, 1883). Also H. H. Bancroft's *Native Races of the Pacific States*; Prof. E. Laveleye's *Primitive Property*, Chapter IX. (London, 1878).

The second type of communism is the theoretical and voluntary. It is developed by the reflective and intelligent association of those who have not been born to this order of things, but who have taken it up by preference. This again distinguishes itself into two great classes. The first accepts communism, not as a general law for human life, but as a special arrangement for a few, in order that these may exert a greater influence upon the rest of mankind. They seek in communism, as Fortlage has well observed, the Archimedean *που στῶ* outside the world, from which to move the world in some direction they think desirable. The second class regard communism as the only right order of human life, the only means of escape from the selfishness and the covetousness which they believe to be the root-evil of human society. They advocate it for the many, not for the few only.

Communisms of the first class are nearly always religious. The forms most familiar are the monastic orders—Buddhist and Christian. Of these we have developed no new order in America, except the Paulist, founded in New York by Father Hecker for the conversion of American Protestants to Catholicism. But we have seen transferred to American soil every notable order of the Roman Catholic Church: the most remarkable in its American activities being that great order of the Jesuits (*q.v.*), which explored the wildernesses of North America, and created the Republic of Paraguay from native material in the southern half of the continent.

In Protestant experiments at religious communism America has more abounded than any European country. The first great group of these is of German origin, the members of the communities being German mystics and separatists, more or less influenced by the ideas of Jakob Böhme (1575–1624.) A sort of forerunner of these was the community of Dutch and German Labadists in Maryland, at the head of Chesapeake Bay (1684–1722). The proper members of the group are (1) the "Woman in the Wilderness," founded on the Wissahickon, within the present limits of Philadelphia, by Johann Kelpius in 1695, and dissolved by his death in 1704; (2) the colony of Dunker celibates, founded in 1713 at Ephrata in Lancaster co., Pa., and imitated by a purely American community at Snowhill, near Harrisburg, Pa., established in 1820; (3) the Harmony Society, established first in Western Pennsylvania, then in Indiana, and finally at Economy, near Pittsburg, in 1824, and still in existence; (4) the Separatist community, established at Zoar in Tuscarawas co., Ohio, in 1817; (5) the Community of the Inspired, a sect established in Germany in 1714–6, as one consequence of the excitement spread through Protestant Europe by the Camisards, and transferred to America in 1846, settling first near Buffalo, but in 1855 removing to Amana in Iowa; (6) the Bethel community in Missouri, with a colony in Oregon, offshoots of a secession from the Harmony Society; and (7) the community of Swedish pietists, founded at Bishop Hill, in Illinois, in 1846, and finally dissolved in 1860–62. All these societies, except perhaps the last, have common characteristics traceable to the influence of Jakob Böhme. They all either proscribe marriage, or treat it as an inferior and less perfect state conceded to human frailty. Strictly celibate

were the community of Kelpius, that of Ephrata, and the Harmony Society. The latter became so in 1807, after two years of community life in the married state, the younger members taking the lead in the change. A great revival of community zeal, as well as religious fervor, was the immediate result. The secession of 1832, which cost them a third of their members, moved in the opposite direction; but their new community underwent a gradual decline,—the Bethel community, mentioned above, being a mere remnant in a new field. The Zoar community passed from compulsory celibacy to the toleration of marriage in 1828–30, and the Inspired always have tolerated it as a less perfect form of life, and require the sanction of inspiration in each case. Even in these communities, however, marriage is no more than tolerated, and the family relations are treated as carnal and secular, in contrast to the ties of community brotherhood. In Zoar the sexes are kept apart in every way possible, and no man is permitted to marry until he has reached his twenty-fourth year.

In their arrangement as to property all these societies are purely communistic, aiming in this to reproduce the condition of things which existed in the Church of Jerusalem after the day of Pentecost (Acts iv. 34; v. 11). In point of prosperity they vary a good deal: the Harmony Society being much the richest, although it has had to sustain numerous lawsuits by members withdrawing from the community. The rights of a member expelled from the Society have not been tested.

"The Millennial Church or United Society of Believers, commonly called 'Shakers,'" might be classed with these German Behmenists on many accounts. Their founder, Ann Lee, while a resident of Manchester, in England, had belonged to a peculiar religious society, which probably was one of those started in England by the disciples of Böhme and Jane Leade and which were influenced by the Camisards. What of theology there is in Shakerism—their notions of a female principle in the godhead; that the first man was male and female in one person; of marriage as a state inconsistent with Christian perfection—is a detritus of Behmenism. The society was gathered first in 1774, at Watervliet, N. Y., organized as a church in 1787, and assembled into community life in 1792. It has a few members who live in the world, under the inspection of the ministry of the communities. The society regards itself as a kind of spiritual priesthood, serving important purposes in that economy of salvation by which all fallen spirits are to be restored to God. As its members are strictly celibate, it perpetuates its existence partly by adopting children and partly by conversions from the world.

The property and the affairs of the society are in the hands of the ministers and elders, who are not chosen by the community and who give no account of their stewardship. Vacancies in their numbers are filled by the surviving members, and complete obedience to the Lead, as these authorities are called, is an especial point of Shaker ethics. These select trustees to manage the property and care-takers to direct the work, and remove or transfer these at their pleasure. Persons who attain to full membership by signing the covenant thereby renounce all claims to the property they have brought into the community, and to wages for their labor while they remain. But it is not unusual for members to abstain from signing. The sixteen communities, spread from Maine to Kentucky, enjoy a varying degree of prosperity. As a rule the members do not work hard. Farming is the principal business, but manufactures on a small scale are practised. Each community is independent of the rest financially. The membership is less than 2500, and they own nearly 50,000 acres of land.

The first religious community of purely American origin was the Hopedale community, founded by Rev. Adin Ballou in 1841, on a farm near Mendon, in Massachusetts. It set before it no less an object than the complete conversion of society to the principles of Christian socialism. It was at once a Christian church and an industrial community. Its members were sundered from the world by the prohibition of voting, office-holding, and the resistance of evil by force of any kind. This last feature led Mr. Emerson to mention it to Mr. Carlyle as the most original contribution America had made to the world's wealth of ideas. It lasted until 1857, but proved at last a complete failure. At first it was purely communistic, but in the hope of attracting persons of some means, a joint-stock system was substituted. The person who proposed this change afterwards employed it to break up the community, by getting a majority of this stock into his own hands. But while it lasted, it was a remarkable instance of an honest effort to realize a great idea.

Four years later was formed the Community of the Perfectionists, another native form of religious communism, and the least reputable of the series. It was organized at Putney, in Vermont, by John H. Noyes, a preacher in the great revival which culminated in 1837. He, with many others, had begun to preach the duty of attaining Christian perfection through a complete emancipation from selfishness, and had reached the conclusion that monogamous marriage and private property were institutions rooted in selfishness. The discovery of his principles and practice led to disturbances which compelled his emigration, in 1848, to Oneida, N. Y., which, with a branch at Wallingford, Conn., remained the seat of the community until it gave up its objectionable practices in concession to a general agitation against these in 1879. Up to the time of change, every woman in the community had been regarded as the wife of every man in it. Sexual intercourse had been regulated by certain esoteric rules, which seem to have had the double object of pratising human stirpiculture, and the prevention of special attachments among the members of the community. At the time of the dissolution, a large proportion of the members entered the married state, and a joint-stock partnership was substituted for communism.

These, with a short-lived community of modified Swedenborgians (disciples of T. L. Harris), on the shores of Lake Erie, make up the series of American communities of the religious type. The Church of the Latter-Day Saints sometimes is classed here, because of certain co-operative arrangements, but incorrectly. The apostles of that body appeal very strongly to the passions for private and especially landed property, in addressing the poorer classes in Europe, from whom they draw their recruits.

Whatever may be true of the influence of the Roman Catholic orders, it cannot be said that these Protestant communities have found in their communism a powerful fulcrum from which to move the world. Their united influence upon the national life is infinitesimal—less than that of the smallest of the American churches. But they and the monks have

solved the conditions upon which communism can maintain itself. The first of these is the presence of some masterful authority, either personal or official, for the control of the membership. Nothing is more notable in the history of these societies than the part played by the founders, and the demand for a strongly constituted paternal authority at the centre. The second requisite is some sort of religious enthusiasm as a motive power. Where this is wanting, individualism is too strong for the community. The third is the exclusion of the family from the community. Where the natural unit has been permitted to exist inside the artificial unit, it has proved too strong for it. Where it has been excluded, either by celibacy or by some such arrangement as that devised by Mr. Noyes—or even where it has been vigorously and effectively depreciated as profane and sensual—then the community has managed to perpetuate itself.

For Kelpius see the *Penn Monthly* for August, 1871; for the Labadists, *Journal of a Voyage to New York in* 1679–80. *By Jasper Dankers and Peter Sluyter*; edited by H. C. Murphy (Brooklyn, 1867); for the Ephrata Community see the *Chronicon Ephratense*, and Dr. Seidensticker's article in the *Century Magazine* for December, 1881; for the Inspired see Max Goebel's articles in the *Zeitschrift für historische Theologie* (1876) and also Chas. Nordhoff's *Communistic Societies of the United States* (New York, 1875), which includes all the later religious Communities except those at Hopedale, Snowhill, and Brocton; for the Harmony Society see Dr. Aaron Williams' *The Harmony Society* (Pittsburg, 1866); for the Oneida Community see J. H. Noyes' *History of American Socialisms* (chapters xlvi–xlvii), also *The Oneida Circular*, 1854–1874, and its continuation, *The American Socialist*, 1875–1879; for Brocton and Snowhill see Noyes.

The foregoing sketch of the American communities founded on religious views enables us to understand the general and rapid failure of communism of the second type, *i. e.*, those which put this order of society before men as the only rightful mode of human life, but refuse to associate this conviction with any views as to the infinite and the eternal. Of these secular communities in America, the two great groups are the Owenites and the Fourierites, but with these may be classed the famous community at Brook Farm, and the Icarian community at Nauvoo, in Illinois.

Robert Owen made his great experiment in communism in 1824 at New Harmony, in Indiana, a village which he purchased of the Harmony Society when the latter returned to Pennsylvania. Into this village there streamed a great multitude of persons of all classes, who thought they would like the new experiment. Nothing that Mr. Owen and his friends could do to defeat the movement was left undone. While asking others to embark their substance in the experiment, he took measures to secure his own interests and to get a return for his investment. He gathered a miscellaneous mass of human material into the village, without exercising any kind of discrimination. He left the community to itself for the first two years of its existence. He changed repeatedly the constitution of the community, one plan after another having proved worthless. Finally he dissolved the community by selling the property, in lots, to private owners. Ten other communities, modelled on Owenite ideas, were established in various parts of the country, but none of them lasted more than a few years, and by 1832 the Owenite movement came to an end in America.

In the interval between this and the Fourierite movement came the memorable experiment at Brook Farm, first suggested by Dr. Channing, and organized by the most remarkable group of men and women that ever embarked on such an undertaking. It had not a solitary condition necessary to success. It professed to be an attempt to realize "Christ's idea of society," but it had no religious enthusiasm as its motive power. It had no central authority sufficient to secure a proper attention to needful work. Its property arrangements, instead of the simplicity of pure communism, consisted of a joint-stock arrangement, somewhat similar to that proposed by Fourier. The community relation, so far from dominating every other, was too weak to stand the first strain. Having no proper basis of its own it fell in with the Fourierite movement in the first month of 1844; but in 1847 it was dissolved through financial difficulties, yet without the quarrel which has characterized every other dissolution.

In 1842 the Fourierite movement was at its height; by 1848 it was a thing of memories and epitaphs. In strictness this movement does not fall within our scope, as Fourier did not favor communism, but common labor and common dwellings based on a joint-stock arrangement. But it stands in such close relation to the history of our communisms, that it cannot be omitted.

To transplant Fourier's ideas to America was a sufficiently hazardous experiment, and especially so in a period of great religious interest such as that in which the experiment was undertaken. There was much in his denunciation of selfishness as a social motive-power which appealed to earnestly religious people, who felt strongly the difference between the actual condition of society and the Christian ideal. But his doctrines as to marriage and his indifference to religion generally were equally offensive to them. These, however, were slurred over by his American disciples generally, who thought to adopt a part of his system and ignore the rest. They founded thirty-three communities or phalanxes in the years 1842–53, of which the last was dissolved in 1855. A few proceeded strictly upon Fourier's principles and methods, and were fair tests of both. The majority were the outgrowth rather of an enthusiasm for his general ideas of attractive labor in society and the abolition of selfishness, than of an exact understanding of his plans. But the extent of the interest in socialist principles is by no means to be measured by these communities scattered over the Northern States from Massachusetts to Iowa. A great agitation stirred the cities of America. Lectures, debates, and conferences on socialism were the order of the day between 1842 and 1847; and a large proportion of the men who were to bear the burden of the war for the Union, or to create American art, literature, and science, were enlisted in the new crusade. But everywhere and under every sort of condition the experiment was a failure.

The interest centred in New York, where it was sustained by Mr. Greeley's *Tribune* and Mr. Brisbane's *Phalanx*. Here the National Convention was held in 1844, under the presidency of George Ripley, the principal founder of the Brook Farm Community, which had joined the new movement. From New York were organized the two most important phalanxes—the Sylvania, in Pike co., Pennsylvania, under Mr. Greeley's especial influence, and the North American, in Monmouth co., New Jersey, under that of Mr. Brisbane. Sylvania was begun in the heyday of first en-

thusiasm; the North American, after repeated failures, had warned the Fourierites that their best men and their utmost efforts were required to carry the experiment to success. Never was an experiment made with more earnestness and self-sacrifice, but the results proved how weak the bonds which unite a secular community. After lasting for ten years, it received in 1853 its first and perhaps fatal shock, by the intrusion of religious disagreements, such as the natural forms of society have to sustain constantly, but which generally prove too much for the artificial forms. Two years later the burning of the community's mills caused its dissolution, and the Fourierite movement disappeared from our history.

Since the failures of the Fourierites the religious communities have had the field to themselves. The only exception is the Community of French Icarians, which, since 1850, has been attempting to carry into practice the ideas of Etienne Cabet, first at Nauvoo, in Illinois, and latterly at Corning, in Iowa. At one time there were fifteen hundred members at Nauvoo; not a twentieth of the number resumed the experiment at Corning. They have no religious principles or observances, and the affairs of the society are controlled by the vote of the membership in weekly meeting. They live in separate dwellings, and sanction marriage. They are very poor, but are out of debt and have overcome great difficulties in the struggle to acquire the ownership of their homes.

The fullest record of the secular communities is found in the *History of American Socialisms*, by John Humphrey Noyes (Philadelphia, 1870). See also Semler's *Geschichte der Socialismus und Communismus in Nord-Amerika*. A good account of Brook Farm will be found in Mr. Frothingham's *George Ripley* (Boston, 1882), in the series "American Men of Letters."

Communism as a theory still exists in some quarters, especially among groups of working people who learnt it in Europe. Mr. Henry George's remarkable work on *Progress and Poverty* (1882) is hardly an exception to this statement. It starts from the premises furnished by foreign economists and socialists. It has in view the evils of European rather than American society in its proposals for the nationalization of the land. And since Fourier's influence ceased, it is the only able statement of such principles in our literature.

That communism of any sort is likely to take any firm or extensive hold of the American people is not the judgment of any impartial observer. This is prevented (1) by the popular love of that liberty which communism denies to the individual; (2) by the strength of those family affections which communism must extirpate; (3) by the general diffusion of private property, and especially of property in land, among the American people; (4) by the increasing influence of Christianity, which points to the future as the scene of a perfect order of human society, and discourages the expectation of the immediate realization of this great hope. (R. E. T.)

COMPTROLLER. An officer of the United States, of a State or of a county or municipality, who has certain duties to perform in the regulation of the fiscal matters of the government under which he holds office.

The office of Comptroller is French in its origin, and was first created in this country upon the organization of the Board of Treasury by the Continental Congress on Sept. 26, 1778. By the terms of the resolution of Congress t t dav
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Auditors, and to certify the balances arising thereon to the Secretary of the department in which the expense has been incurred; to countersign all warrants drawn by the Secretaries of War and of the Navy which shall be warranted by law; to report to said Secretaries the official forms to be issued in the different offices for disbursing the public money in those departments, and the manner and form of keeping and stating the accounts of the persons employed therein, and to superintend the preservation of the public accounts, subject to his revision.

By the act of June 3, 1864, a Third Comptroller has been added to the Treasury Department, known as the Comptroller of the Currency. He is at the head of the Bureau charged with the execution of all laws passed by Congress relating to the issue and regulation of a national currency. He makes an annual report to Congress showing the state of the National Banks in the country, the capital embarked in those enterprises, the volume of the circulating notes, and other matters of financial interest.

The office of Comptroller also exists in many of the States *eo nomine*. In some States the functions of a Comptroller are discharged by an officer known as a State Auditor or Auditor-General. It is usually the duty of a State Comptroller to superintend the fiscal concerns of the State, and to manage the same in the manner required by law. He exhibits to the Legislature, at stated times, accounts of the receipts and expenditures of the State, suggests plans for the improvement and management of the public revenue, keeps and states all accounts of the State, directs and superintends the collection of all moneys due it, and either draws or countersigns all warrants on the State Treasurer. The various States differ, of course, materially as to the powers and duties of this officer.

In many of the counties and municipalities of the United States, the office of Comptroller exists with duties substantially similar to those above specified. The existence of the office is generally esteemed to constitute a most salutary check on improper and unlawful appropriation of the public funds. (L. L., JR.)

CONANT, THOMAS JEFFERSON, D. D., an American Baptist divine and Biblical scholar, was born at Brandon, Vt., Dec. 13, 1802. He graduated in 1823, at Middlebury College, Vt.; was for a time tutor in Columbian College, Washington, D. C., and later became professor of language in the college at Waterville, Me., resigning this place in 1833. In 1835 he was made professor of Biblical literature and criticism in the theological school at Hamilton, N. Y., and afterwards studied for some years in Germany. In 1850 he accepted a similar professorship in the seminary at Rochester. In 1857 he removed to Brooklyn, and devoted himself to the work of preparing a revised English Bible, under the auspices of the American Bible Union. He was afterwards one of the American members of the Old Testament Company for revising the authorized version. Among his publications are annotated translations of the book of *Job* (1857), *Matthew* (1860), *Genesis* (1868), the *Psalms* (1868), and *Proverbs* (1872). His wife, HANNAH CHAPLIN (1809–1865), a daughter of Rev. Jeremiah Chaplin, D. D., became well known as a translator and author. Her chief work was *A History of the English Bible* (1856).

CONCEPTION is a logical term, variously defined. [illegible] agree in giving to the word a signif- [illegible] corresponds to one of the ideas involved in [illegible]—viz. the idea of unity in multiplicity.

Conception, from *con* and *capio*, means taking or grasping several things together or at the same time. Accordingly, pure Nominalism employs the word to denote any complex idea, such as that of a horse. "I have the ideas of the sensations of sight, of touch, of hearing, of smelling, with which the body and actions of a horse have impressed me, these ideas all combined, and so closely that their existence appears simultaneous, and one. This is my idea of a horse. If I say I have a conception of a horse, and am asked to explain what I mean, I give the same account exactly, and I can give no other" (James Mill, *Analysis of the Phenomena of the Human Mind*, new ed., vol. ii. p. 284). To have a conception is thus to have several ideas together, as if they were but one. Mr. Mill—of whose doctrine J. S. Mill opines that it "is as just as it is admirably stated"—is careful to use the phrase "I have a conception," rather than "I conceive," in order to exclude the notion that conception involves a special intellectual activity; according to his sensational theory, all knowledge must be regarded as merely "impressed" on the mind, rather than as resulting from an active labor of the mind itself. Thus viewed, a conception can only be particular, not general; or, at most, it can only be the name for the whole aggregate of particular complex ideas which one has actually "had," and which are held to resemble each other.

According to a more universal doctrine, founded on a more experimental and concrete theory of the nature of knowledge, conception is not a mere state of mind, but also, and primarily, an intellectual activity. It denotes not simply "having together," but "putting" or "grasping together." It is a selective and discriminative act, directed at once by the laws of thought and by the nature of the immediate subject-matter about which thought may be employed. And its result is a general notion or concept, which embodies whatever is known to be universally essential to the existence and nature of the object, or class of objects, under consideration. The object of the concept is thus the universal law or nature of an object, in distinction from the purely individual peculiarities whereby one object is distinguished from another of the same kind.

Concepts of the highest order of generality (pure concepts) are often termed Categories. Thus, for example, the twelve "categories" enumerated in Kant's famous table are termed by him "fundamental concepts of the understanding"—*i. e.* of the understanding as employed about all possible objects in *space and time*. They denote, in other words, aspects or relations, some of which must enter into, and, *pro tanto*, condition, the form of all our particular conceptions of physical objects. (G. S. M.)

CONCEPTUALISM, as a system of philosophy, must be viewed in its relations to other modes or stages of thought. The distinction between subject and object, familiar and esssential to modern thought, appears, in the history of philosophy, only after the lapse of ages in which the mind looked out upon the world, trying to understand it, but not perceiving that what it called the world could be only known in its relations to a sentient subject, the observer himself.

In Plato, the idea, the objective counterpart of the (subjective) concept, is a permanent reality underlying all phenomena, suggested by them, not deduced from them. He assumes, rather than proves, the (objective) existence of the idea; and it would seem that the process of definition on which he lays so much stress, and which he so carefully develops, is a search for

clear and distinct "ideas." But these are not contrasted with concepts as products of the mind itself, giving unity in consciousness to manifold objects of cognition. The idea is either subjective or objective, or both in one. It may be only regulative, or, as Plato seems rather to regard it, it may be *constitutive*, individuals being what they are by "participation" (*μετάληψις*) in the idea. But psychology must be developed far beyond the point which it then had reached, before the relation of the concept to the idea could be distinctly sought. Plato we may call, however, an "extreme realist."

The case is not very different with Aristotle. The form, *εἶδος*, or essence of things, is universal, apparently objective. The concept (if *λόγος* can be deemed equivalent to our modern word) defines or expresses the essence of things (*ἡ κατὰ λόγον οὐσία.*) But no distinction is clearly made between thought and what it supplies to experience on the one side, and objective being on the other. Aristotle, accordingly, has been called a "moderate realist," or, again, a "conceptualist."

Conceptualism had a later origin. The prevailing subjectivity of some of the sophists, and, still more, of the critical Academy, and the Pyrrhonists, by awakening doubt, and demanding an answer to critical questions (*e. g.*, Is man a measure of all things? *πάντων χρημάτων μέτρον*) might have elicited a solution of the problem, if their method had not been destructive of philosophy itself.

We may say that when the terms *νόημα*, *ἐννόησις*, and the like appear, we are reaching at least the possibility of conceptualism. Among the ancient Stoics, then, we may find the nearest approach which ancient philosophy makes to modern conceptualism, for the problem appears when a (subjective) criterion of truth is sought for which involves a nearer approach to the psychological methods of modern philosophy. The Stoical theory of knowledge resulted naturally from their materialism, and we may call them the unconscious, inconsistent nominalists or conceptualists of their age. The only reality is an individual, corporeal thing, which produces in the soul impressions (presentations, *φαντασίαι*) like a seal on wax. These, being individual effects, must be assumed to be produced by individual objects. Chrysippus, in whom the psychological tendency begins to appear, includes among these objects of knowledge individual states and activities which can be referred only to the mind itself. Remaining in memory, these impressions produce experience, and are united in common notions (*κοιναὶ ἔννοιαι*) by comparison, combination, analogy, etc. (*Diog. Laert.* VII.) The concept (*τὸ ἐννόημα*) is therefore a mental product, a "phantasm of the understanding," in which, somehow, truth is found. The eternal ideas of Plato are, for the Stoics, only *ἐννοήματα* produced by sense-perception; as we may say, images together with the notion of a universal application, and a subjective certainty of an object represented. Ideas or concepts, as such, are neither true nor false. Truth or falsehood is found only in connecting them. (This must be *logical* truth.) Concepts exist in the mind only for what they are. Universality consists in their application to a number of individual things whose differences generic terms do not represent to the mind.

The well-known passage translated by Boëthius from Porphyry presented this (undeveloped) Stoical conceptualism to the middle ages as one of possible theories: "Whether genera and species subsist by themselves, *or in thoughts only*, *ἐν μόναις ψιλαῖς ἐπινοίαις* (*i. e.*, concepts of the mind subjective and abstracted), etc." When logic, and consequently the use and signification of terms, were the principal subjects of investigation, the problem could not be ignored. It was only natural that a crude nominalism should at first appear; but a subtle thinker like Abélard was not likely to rest in it. Although the tract *De Generibus et Speciebus* may not be his, and we have not elsewhere in his authentic works any explicit discussion of the subject, it certainly represents the prevalent opinion of his school. And Abélard himself, without distinctly enunciating his conceptualism, applies it to the Christian doctrine of the Divine Trinity. As nominalism must consider "three Persons" to be three individuals, so he interprets them (conceptualist) as the power, wisdom, and love of God. For the problem could not remain an abstract discussion of logic in the schools. Penetrating, as it does, to every part of philosophy, it must needs affect most those questions (*e. g.*, the being of God) which were then most in dispute. For on its solution depends our mode of regarding politics, nature, man, the universe, God himself.

In the tract *De Gen. et Spec.*, against realism, individuals are the true and only substantial reality, and in them exists only the individual. Against nominalism, general words are not mere names for individuals. The words represent things. What things? It is answered (*Ab. Opera*, (Cousin's) Vol. III., p. 522) from Boëthius, "*nihil aliud species esse putanda et nisi cogitatio collecta ex individuorum dissimilium numero substantiali similitudine; genus vero collecta cogitatio ex specierum similitudine;*" the species or genera are formed by the mind from individuals which resemble one another. Both matter and form are individual only, but the matter (*e. g.*, man) is similar in Plato and Socrates (p. 524), and that essence of man which underlies (*sustinet*) the individuality of Socrates is nowhere but in him. Species, then, is not that essence of man which is in Socrates alone, or any other, but that "whole collection conjoined, of individuals of this nature. This whole collection, although essentially manifold, custom calls one species, one universal, one nature; as a people, although composed of many persons, is called one." As for genus, "each particular essence of that collection which we call humanity is composed of matter and form; the matter is animal, the form several,"—"but that animal which underlies the form of humanity in one is not essentially elsewhere."

This, of course, is a discriminative nominalism, a peripatetic form, attempting to evade some of its consequences. Words, indeed, sensuously viewed, are but a breath of air (*flatus vocis*), but they are invested signs for these results of comparison, abstraction, and generalization, and they accompany each successive step of these processes, fixing each as it is accomplished.

With William of Occam (d. 1347. A. D.) that English nominalism and co[n]
long career which they still pu[rsue]
says, is of individuals only: "sc[ilicet] [ter]
gularibus." Terms are signs of [con]
alist), but concepts are unde[r]
result of abstraction from many [in]
ligible species" is a non-entity.
indifferently for many indivi[duals]
univoce plura singularia."

The logical questions from whi[ch]

its rise involved the significance of terms rather than the nature of objective truths, and the mode in which the mind arrives at it. But with the advent of modern philosophy we find new questions arising, new modes of arriving at truth.

Hobbes seems to stand on the dividing line between the mediæval and the modern. His forms of thought are scholastic, while his nominalism is modern, *ipsis nominalibus plusquam nominalior.*" "Nothing," he says, "is universal but names," and "universals recall one of many things." (*Lev.* I., i. 4.) Yet, after all, Hobbes, in his calm assumption of the objectivity of his knowledge, and his superficial psychology, is himself a schoolman out of date, and in revolt from his school.

...t when Locke views his "idea" (individual ...on) as the only direct object of knowledge, and the ...dium between the sentient subject and the (assumed) ... ...ective actuality, it is plain that conceptualism is be... ...s in a new and modern dress. Locke may be ... ...lered as the representative conceptualist of modern ..., and modern idealism in general as the successor ... mediæval (logical) conceptualism; we will let con...tualism, therefore, state its principle through its ...f exponent. We still find ourselves on nominalist ...und when Locke says, "all things that exist are ...ulars (individuals) only." But admitting his ...ple ideas" of single qualities, either existent in ... ...med) objective realities, or produced by them in ... ...t is plain to him that the mind may combine these, ...will thus form a complex of qualities to which a ...ral name is attached. "The mind being furnished ... ...ion and reflection) with a great number of ... ...ple ideas, conveyed in by the senses, as they are ...und in exterior things, or by reflection on its own ...tions, takes notice also that a certain number of ... ...ple ideas go constantly together; which being ...d to belong to one thing, and words being ... ...common apprehension—are called, so united ... subject, by one name." (*Essay on Hum. Und.*, ..., c. 23.) Words stand for ideas only (B. III., c. 2. § 4), but "words become general by being made ... ...ns of general ideas; and ideas become general ...separating from them the circumstances of time, ...place, and any other ideas that may determine ...m to this or that particular existence. By this ... of abstraction they are made capable of repre...ing more individuals than one, each of which has ... ...conformity to that abstract idea." (B. III., c. 3, § 6.) Names (§ 7) are at first particular (individual), but children, observing resemblances among things, form complex ideas, imperfect as respects those individuals, but capable of representing each one. "Thus they come to have a general name and a general idea"—"...ving out of the complex idea they had of Peter James, etc., that which is peculiar to each and re...ing only what is common to all." Then children ... ...vance to still more general names and notions. (§ 8.) "For, observing several things that differ from their ... ...of man, and yet have certain similar qualities, and ...ing them into one idea, leaving out the differences, ...y have again another and more general idea." ... notions, then, are, and words signify, "abstract ...ial ideas of more complex ones taken at first ... particular e... nces." (§ 9.) Thus, if Locke's ... of med... ...knowl... through "ideas" is ... conced... se... ...o be ablished on a ... imn... bl... ... ...for ... ...als and uni... ... to the ... ... things, but are the inventions and creatures of the understanding, made by it for its own use, and concern only signs, whether words or ideas." (§ 11.) This, in Locke's opinion, is not nominalism. General words do not "signify barely one particular thing," or a plurality; but they do signify this "abstract idea" which is all one with the "essence of the species." (§ 12.) Here we pass to the consideration of the objective nature of things, which, according to the theory, is not directly known, but is individual only. Things may be similar in certain qualities, but species signifies this abstract idea, this "creature of the understanding."

The third book of Locke's Essay is the best development of conceptualism which has thus far appeared; but it is too familiar to need more than this passing reference. The "good Berkeley," however, though retaining and developing Locke's idealism, can find in these abstract general ideas only a subtle net to ensnare the wit of man (*Introd. Princ. of Human Knowledge*, § 22.) He can discover in his own thought only "particular ideas" (confounding conception and imagination), but they may become virtually general by representing an "indefinite number of particular ideas of the same sect." (§ 12.) This destructive criticism evidently lands us in pure nominalism, for words (general names) "signify indifferently a great number of particular ideas."

We may pass on, therefore, to the final dissolution of idealism in the crucible of Hume's scepticism. Pursuing the same nominalist track on the same ground of idealism, and finding once more that "all general ideas are nothing but particular ones annexed to a certain term" which represents any one of them indifferently, we reach at last the (positivist) conclusion that nothing but "ideas" can be known, simple qualities connected, correlated, under the influence of associations. We may call this indifferently nominalism or conceptualism, since any conceivable difference has vanished, but Hume expresses himself in the ordinary nominalist manner.

With Reid begins the attempt to dismiss ideas altogether, and, under the guidance of "common sense," to bring the mind directly in contact with the object. In a vague way he seems to admit the conceptualism of Locke. "The power of forming abstract and general conceptions [which Berkeley so explicitly denied] is one of the most distinguishing powers of the human mind" (*Intell. Powers*, Ess. V., c. 6). "Common names signify common attributes," and need not actually represent any individual thing. He could understand perfectly and have a distinct conception what was meant by such and such a mathematical line, without ever "conceiving" in his imagination one of the kind. In fact, Sir Isaac Newton reached the general conception of lines of the third order before he found out the particular species of them. But what under Reid's theory were *common* attributes, while the only existences, as he says, are individual, he (as usual) failed to explain. The whiteness of this sheet of paper, he says (c. 3), is not the whiteness of that sheet; it is individual; but whiteness (taken simply) implies no existence: it is general; it may be predicated of many things. So then there are "general conceptions signified by such names," viz.: every attribute common to several individuals. "Nature has given us the power of combining such simple attributes, and of giving one name to that combination, and considering it as one object of thought." (c. iv.) This sounds like conceptualism, although we are told

again, "each of those names signifies in general a substance (individual) having a certain combination of attributes. The name, therefore, must be common to all substances in which those attributes are found," and now we seem to be listening to a nominalist, and may reasonably arrive at Sir Wm. Hamilton's conclusion that there is no essential difference between the two. Dr. Brown seems to give conceptualism a firmer foundation, pointing out also the imperfect analysis made by nominalism which, in his view, leaves out from its theory the *resemblances* of things. Forming general notions, he says, is discerning relations between many individuals. Certain things are found to have more intimate and more numerous relations than others. If not, John and an egg might as well be classed together as John and Peter. This notion of relations constitutes that thought which we express as species and name accordingly; and so the general name signifies "the general notion of the relation of similarity in certain respects" (*Philos. Hum. Mind*, xlvii.); see also Sir W. Hamilton's *Metaph. Lect.*, xxxv.).

Kant, also, rejecting pure idealism which in the hands of Hume was proving such a solvent of all knowledge, tried to lead thought out of the shallows of pure nominalism where it must lie stranded and helpless into a discriminative conceptualism. This, at least, if not the object, is a result of his criticism. For, if materials of knowledge (phenomenal) are given by experience only, and the forms of thought are supplied by the mind, it is evident that whatever universality the concept possesses, and, with it, general names, is due to the mind itself. Nominalism has talked as if things in themselves were known. That conceit of knowledge is rudely swept away. Such things may exist, but, being unknown, Kant would hardly say that general names stood indifferently for any one of them.

But nominalism cannot be thought to have abandoned the field while it speaks so clearly against conceptualism as in Mill's discussion of Sir W. Hamilton's doctrine of concepts (c. xvii.). "A concept is a mere part of a concrete image—has nothing that discriminates itself from the other parts except a special share of attention, guaranteed to it by special association with a name, etc." Thus the general is eliminated, or reduced to a plurality of individuals, and that plurality has no essential ground of unity. Similarity in our feelings as affected by the object leads to a practical identification, either inward and subjective (conceptualism), or objective (Platonic idealism).

Mill, like other nominalists, ignores the law that no empirical concept exists without an image in representation, and these two so distinct in their characteristic marks are confounded. "To say that we think by concepts is a circuitous way of saying that we think by means of general or class names." It is "a misfortune that the words concept, general notion, or any other phrase to express the supposed mental modification corresponding to a class name, should ever have been invented." Mill, as we see, would erase the term "Begriff" from the German Lexicon. "Instead of the concept of a class, we should speak of the signification of a class name."

In this brief glance at the historical progress of one of the principal modes of thought we have thought it best to let conceptualism speak for itself, or display itself in encountering the attacks of its nearest relative, nominalism.

The question for so many ages asked in various forms is briefly this: Viewing the world of phenomena as presented to consciousness, and uniting these correlated in the unity of individual objects, do we thus terminate our knowledge of being? A crude nominalism answers, yes. Being is a plurality of individuals united by no common essence or nature. Names stand only and indifferently for any one of these which similarly affect the sentient subject. But genera and species are nothing but "class names," representing a plurality of objects whose resemblances are more or less indefinite, and which we collect into conventional groups for our convenience in examining them. Realism says, no: There is a permanent reality in genera and species. Even if these forms have been produced by gradual development, there is a fixed type or plan at the end toward which that evolution has proceeded. In some manner left unexplained, individuals "participate" (*μεταλαμβάνειν*) in the idea; or, the universal is a com[illegible] objectively existing in each individ[illegible] in knowing it we know the *essence* [illegible] it is; *τὸ τί ἦν εἶναι* or being is only [illegible] manifold is but manifestations of [illegible] from it, having, as such, no reality. [illegible] manifold, being is only one (in which [illegible] seem that either names represent collecte[illegible] or else the one is expressed under many n[illegible] finally, finite beings, though many, pre[illegible] thought of one infinite Being; this [illegible] stitutes their unity, and the common n[illegible] it as suggested to human reason in its [illegible] individuals belonging to time and s[illegible]

Conceptualism, while seeming [illegible] mediate position, is in reality a form [illegible] (Sir Wm. Hamilton) in which t[illegible] of thought has come distinctly int[illegible] difference is one of method only, or [illegible] garding the same truth. Atten[illegible] processes involved in gener[illegible] jective result whereby thi[illegible] *cepta*), which result is not [illegible] be fo[illegible] mind itself.

The (empirical) concept in it[illegible] referred to the (Platonic) idea, [illegible] formation is so different; but [illegible] ignores the latter, if it do not deny [illegible] fore, be regarded as a psychol[illegible] fundamental (negative) princi[illegible] of any objective validity in univ[illegible] viewed the only reality which t[illegible] or possible, past, present or fu[illegible] jectively viewed, their name is [illegible] individual mental product.

Under the guidance of the one [illegible] other, ages, parties, schools have b[illegible] defended one another, seeming to solve [illegible] of the everlasting riddle of the Sphynx. truth? Conceptualism is the special t[illegible] subjective and introspective [illegible]. It [illegible] richly loaded with the fruits of [illegible] met the demands of the se[illegible] understanding.

It is evident, however, that so [illegible] empirical road to knowledge, we [illegible] nominalism and concept[illegible] reason attempts to lead [illegible] ourselves in the lin[illegible]ds of [illegible] Plato and Par[illegible] the mediæval [illegible] will [illegible] Hegel or Schelli[illegible]

science, whether of matter or of spirit, conceptualism has proved, and, doubtless, will prove, a sufficient and satisfactory theory, since the concept itself is an empirical product, and the question of its objective reality belongs to ontology and not to any special science. (J. J. E.)

CONCORD, the capital of New Hampshire, and seat of justice of Merrimack co., is on the Merrimack and chiefly on its W. bank. It is 73 miles by rail N. N. W. of Boston, and is the converging point of the following railroads: the Concord, the Concord and Portsmouth, the Northern, the Boston, Concord, and Montreal, the Concord and Claremont, and the Peterborough Railroad. Across the Merrimack there are 7 bri[illegible] 3 of them railway bridges. Concord has a granite State-house standing in a fine park, [illegible] n, a State insane asylum, a city hall, 2 [illegible]anages, a home for the aged, 7 hotels, 3 national [illegible] savings banks, 4 weekly and 2 daily newspapers, [illegible]e libraries, 18 churches, public, high, and graded [illegible]ols; also St. Paul's school, a celebrated private [illegible]ol for boys. Concord has a large number of fac- and shops, a part of them run by water-power, [illegible]gh the motive power of the Merrimack, natur- very great, is here not extensively utilized. Cot- [illegible] goods, woollens, furniture, castings, and carriages [illegible] 3 leading articles of manufacture. Here are [illegible]tensive quarries of fine white granite, also stone- [illegible]g works, machine works, and the shops of two [illegible] railroads. The city has water- and gas-works; [illegible]p y is assessed for taxation at $10,000,000, and [illegible]city debt is $175,000 net, besides the water-works of $630,000. The streets are well laid out and [illegible]vely sewered. Population in 1870, 12,241; in [illegible]1880 16,948. Concord was settled by Massachu- people in 1726; was incorporated as the town of [illegible]ord in 1733; was named Concord in 1765, and [illegible]received a city charter in 1853.

CONCORD, a town of Middlesex co., Mass., 20 miles N. W. of Boston by the Fitchburg Railroad. Population, 4435. It was the seat of an Indian village previous to its settlement by Rev. Peter Bulkley and Major Simon Willard in 1635, who gave it the name "Concord" from the Christian union and concord among the first settlers, and their peaceful dealings with the Indians, of whom they bought the land. The river on which it stands was called by the Indians "Musketaquid," or "Meadow River," from the great grassy meadows beside it. The apostle Eliot often preached to the Indians here, and there was a village of Christian Indians on the border of the township. But the colonists could not avoid Indian wars, and many of them were killed from 1648 to 1730 in these wars. It soon became an important inland town, and maintained a military company, which took part in the overthrow of Sir Edmund Andros at Boston in 1689. As early as 1767 the Concord people became active in opposition to British taxation, and in 1774 were ready for the separation from the mother-country, which took place, so far as Massachusetts was concerned, in 1775. At that time the population of Concord (including the parish of Carlisle) was 1900, out of which it furnished 174 men for the army of Washington.

See Vol. VI. p. 214 Am. ed. (p. 240 Edin. ed.).

"The town's own experience of the Revolutionary [illegible] limited to the so-called "battle of Concord," [illegible]ce April 19, 1775, between two regi- [illegible]of [illegible]d militia and minutemen, commanded [illegible] but led in the engagement by Major John Buttrick (both citizens and farmers of Concord), and a detachment of British infantry, grenadiers, and marines, commanded by Lieut.-Col. Smith and Major Pitcairn. The occasion of the encounter was the accumulation of colonial military stores at Concord, where the provincial congress of Massachusetts had been in session in October, 1774, and March, 1775, with John Hancock as president and Samuel Adams as one of its leading members. Gen. Gage, the British commander in Boston, hoped to destroy these stores, and also to seize the persons of Hancock and Adams, who were supposed to be at Lexington, on the road from Boston to Concord. He therefore sent out the detachment above mentioned of 800 men on the evening of April 18, and followed this up with a supporting party of 1100 men under Hugh, Earl Percy, a brigadier-general, who, however, got no farther than Lexington, six miles east of Concord. The first detachment was confronted at Lexington before sunrise, April 19, by the minutemen of Lexington, who, when fired upon, dispersed after a few scattering shots in return. By this time the whole country was alarmed by the vigilance of Paul Revere (whose famous ride extended no farther than Lexington), and at Concord a force of 180 men had gathered before the British 800 came in sight at seven o'clock in the morning. Rev. William Emerson of Concord, grandfather of Ralph Waldo Emerson, urged immediate resistance with this small force, but more cautious counsels prevailed, and Col. Barrett ordered a retreat across the North Bridge to await reinforcements. Meantime, the British began to seize and burn the military stores in the village, and were supposed to be destroying the town; whereupon the American militia, now increased to 300, were formed in column by Lieut. Joseph Hosmer of Concord, who acted as adjutant, and began marching toward the village square to prevent the burning of the place. As they approached the North Bridge, which was guarded by a British company, they were fired upon, and several Americans were killed. The Concord and Acton minutemen, by order of Major Buttrick, returned the fire, killing three British soldiers and wounding seven more. The British at once retreated, but were not then pursued, and this ended the actual fight at Concord bridge. But when the whole British force began their retreat about noon they were fired upon along the road from Concord to Lexington, and lost many men within the limits of the town. At Lexington they were reinforced by Gen. Percy and his brigade, with two field-pieces; but the whole body then retreated to Charlestown, pursued all the way, and losing in the whole day's engagement 73 killed, 172 wounded, and 26 missing—271 men out of 1900. The loss of the Americans was 49 killed, 36 wounded, and 5 missing—or one-third as many as the British lost. Two captains and two privates of the Concord men were wounded. This was the first battle of the war, and was the last time Concord was invaded by armed enemies.

Exactly eighty-six years after the above battle the Concord militia, commanded by Capt. Prescott, left town to join in the defence of Washington against the Southern rebels (April 19, 1861). During both these wars the Concord people kept a large number of soldiers in the field, and were liberal in their contributions of money and supplies. Two monuments have been erected to commemorate the fight at the North Bridge —one erected in 1836, on the spot where the British stood,—a granite shaft, with an inscription describing

the event; the other a bronze statue of a minuteman standing where the first American soldier fell, on the west bank of the Concord River, and erected in 1875. In the village square stands a "soldiers' monument" to commemorate the Civil War of 1861–65; and in the Sleepy Hollow Cemetery, not far off, are the monuments of Emerson, Hawthorne, Thoreau, and other famous citizens of Concord, who are buried there.

Since 1834, when Emerson went there to live in the "old manse" of his grandfather Dr. Ripley, where he wrote his first book, *Nature*, the town has been the home or the resort of many persons celebrated in literature and philosophy—of Bronson Alcott, Margaret Fuller, Ellery Channing, Mrs. Sarah Ripley, Miss Hoar, Miss Alcott, Thoreau, Hawthorne, Miss Peabody, Mrs. Jane Austin, Prof. Harris, etc. Emerson, Thoreau, Channing, and Hawthorne have made the scenery of Concord familiar by their descriptions, and the social character of the place has been described by George W. Curtis in his *Homes of American Authors*, and by F. B. Sanborn in his sketches of Emerson, Lowell, and Thoreau. It is a quiet region, inhabited chiefly by farmers and professional men, on the banks of the Concord River, and with Walden Pond and other small lakes near by.

Since 1878 the State prison for men, formerly at Charlestown, has been established in the western part of Concord, and about 800 of its present population are the convicts, officers, and employés connected with the prison.

The town contains three churches—Unitarian and Trinitarian Congregationalist and Catholic—and two chapels, one Episcopalian. The "Hillside Chapel," on the estate of Mr. Alcott, is used in the summer for the sessions of the "Concord School of Philosophy," which was opened in 1879, and in which lectures and conversations have been given by Emerson, Alcott, Dr. Jones, Dr. Harris, the late Prof. Peirce of Cambridge, Pres. McCosh of Princeton, Mrs. Julia Ward Howe, Dr. R. G. Hazard, Mrs. E. D. Cheney, and others of the Transcendental or the Hegelian schools in philosophy. The founder of this unique school (see ALCOTT) is Mr. A. Bronson Alcott of Connecticut, who has lived in Concord most of the time since 1840, and still flourishes there at a great age. His daughter, Miss Louisa Alcott, is also a resident of Concord, and so is Prof. W. T. Harris, the chief Hegelian teacher in the School of Philosophy. Several eminent American journalists —Frederick Hudson, William S. Robinson, Robert Carter, C. C. Hazewell, and F. B. Sanborn—have been residents of Concord, and Hon. George F. Hoar, Senator from Massachusetts, was born there, as were also his elder brother, E. R. Hoar, who was attorney-general in Gen. Grant's first administration, and William Whiting, who wrote elaborately in favor of Pres. Lincoln's right to emancipate the slaves under the war-powers of the Constitution. Concord was one of the centres of anti-slavery opinion for twenty years before emancipation, and had been still earlier a focus of the Transcendental movement in New England. See ALCOTT, EMERSON, and THOREAU. (F. B. S.)

CONCRETE. This name is given to any mixture of mortar with fragments of stone or gravel, though it is now generally limited to that made with hydraulic mortar, or mortar made with a hydraulic cement. Certain limestones, when calcined, produce a natural hydraulic cement. As, however, the proportions of the elements vary in different pieces of the same rock, it is much better, in order to obtain a uniform product, to use the so-called Portland cement, in which the constituents are mechanically mixed in the proper proportions. This consists of a double silicate of lime and alumina—about 60 parts of lime and 10 of alumina to 24 of silica, with 1 of magnesia and 2 of other alkalies, in a total of 100 parts. Carbonate and sulphate of lime should be especially excluded. This mixture should weigh 115 lbs. per bus., and bear 250 lbs. per sq. in. in tension. It should likewise be ground sufficiently fine for 85 per cent. to pass through a sieve of 50 meshes to the inch. It should feel rough, and be of a bluish-gray color, and when immersed in water of a uniform temperature for six days should show no cracks, but should set in from one to six hours. If mixed with lime it will not get so hard under water. As a test of its quality, it is recommended that blocks 1½ in. sq. and 10 in. long, supported on edges 9½ in. apart, should bear 150 lbs. at the centre; if more than 1 out of 3 are broken within one minute, the cement should be rejected. In Germany the usual test is for blocks of 5 sq. centimeters section to stand, under tension, 8 kilogrammes per sq. centimeter; the blocks having been for 24 hours in the air and for 27 days in water. It is there also specified that when the cement is passed through a sieve of 900 meshes per sq. centimeter, not more than 25 per cent. shall be too large to go through.

The lighter cements set more quickly than the heavy ones, and the natural cements, of which Rosendale may be taken as a type, only bear in tension 40 to 70 lbs. per sq. in. In mixing the cement for use in concrete, the best proportion of water is such as will make the mortar only moist, so as barely to cohere; the proportion will be about 1 of water to 4 of cement, though English Portland may require a little more water. Sand is always mixed with the cement for the sake of economy and to prevent cracking; it lengthens the period of setting and likewise diminishes the strength, in the proportion of one-half for an equal mixture, to one-fourth for a mixture of four of sand to one of cement. Ordinarily, in building, the natural cements, such as go by the name of Rosendale in the market, are mixed with 1 to 1½ part of sand, while Portland cement is mixed in the proportion of 2 to 3 parts of sand, the character of the work influencing the engineer in his decision of the ratio. The sand and cement are mixed together dry with a shovel, and the water afterwards added. This is to obtain a thorough intermixture which would otherwise be difficult on account of the weight of the sand being less than that of an equal quantity of the cement, and, therefore, tending to float on top of it. The sand should be in coarse grains of [illegible] being better than "bar" [illegible]

The best broken stone [illegible] granite or basalt, or other h[illegible] an irregular shape and not [illegible] and free from dust. It is spread [illegible] of boards. If gravel is likewise [illegible] placed at the bottom and the [illegible] and the layer should be from 8 [illegible] mortar is then spread over it in [illegible] usually, of one-half to two-thi[illegible] of the mixture with gravel. W[illegible] stone are used together, the gr[illegible] one-half the bulk of the broken [illegible] terials having been thus collected [illegible] mixed with shovels and hoes wor[illegible] to the centre and back again twice,

skilfully done, each stone will be covered with mortar, and the mixture is ready for use. When put in its permanent place it should be well rammed, a good size of rammer being 4 ft. long, 8 in. in diameter at the foot, with a lifting handle, and shod with iron. It is let fall about six inches.—See BITON and AQUEDUCTS.

(T. M. C.)

CONCUSSION. The word *concussion*, originally applied in surgical writings to certain symptoms of several ill-defined conditions of the brain or spinal marrow, supposed to follow severe injuries not accompanied with external evidence of actual lesions, has gradually been narrowed down until now it has come to signify rather the injury itself than the phenomena resulting from it. At present, although it is at the best a misnomer, by concussion of the brain or spine the majority of surgeons mean that, in consequence of a severe blow, or some similar injury, generally unattended with fractured bones, or with extensive wounds, one of the following four conditions of the nerve centres has been produced: 1. A disturbance in the molecular relations of the nerve tissue, not demonstrable, of course, but aptly compared to the change in the particles of a magnet which causes it to lose its power when forcibly struck by a hammer. 2. An extravasation of serum into the nerve structures, due, it is thought, to a temporary vaso-motor paralysis. 3. Actual contusion or bruising of the brain or cord with extravasation of blood. 4. Laceration or tearing of the substance of the brain or cord. It would be better to limit the use of the term concussion to the first of these conditions, to which alone it is strictly applicable. The symptoms of the second and third are due either to pressure, compression, or to subsequent inflammatory changes; of the fourth to the actual disorganization of nerve structures. They may, however, be described under this head. Although in respect to symptoms the first and slightest of these four degrees of injury is easily distinguishable from the last and gravest, the diagnosis of the exact amount of damage to nerve tissue and the differentiation of true concussion from that surgical condition known as "shock" are by no means easy. At the other extreme an equal difficulty is experienced in separating those cases of serous or hemorrhagic effusions, or of tearing of nerve structure, which, on account of the absence of certain symptoms, such as coma and paralysis, are included under the head of concussion, from cases of true *compression* of the brain. Remembering, however, that the lines cannot be drawn too strictly we may describe as follows the characteristic symptoms of these four classes of injury: 1. After a blow of medium force upon the cranium, or a fall from a height, a patient on attempting to rise staggers and falls, his skin becomes cold and bedewed with a cold perspiration, he is confused, or possibly even insensible for a short time, his face is pale and shrunken, his pulse is feeble and intermittent, his breathing sighing and interrupted. After a few moments, or at the most a few hours, reaction sets in; vomiting, indicating a return of reflex sensibility, occurs, the face becomes warmer, the pulse stronger, the mental symptoms gradually disappear, and the patient in a short time is entirely well. 2. After an injury of greater severity we have the above symptoms much intensified, especially as regards sensation and motion. The patient is oblivious to the external world, and can be aroused with difficulty. He lies motionless, or drawn up into a peculiar position, with the legs flexed on the thighs, and the thighs on the abdomen, and obstinately resumes it if he is forcibly straightened. The same conditions of pulse, skin, and respiration prevail, only more markedly, and the duration of the attack is greater, often extending over several days. 3. If the brain is contused over a very moderate area, or if the accompanying extravasation of blood is small in amount, diffused instead of circumscribed, or situated in certain regions, we may have, instead of the phenomena of *compression* usually seen in cases of hemorrhage into the brain substance or ventricles, simply those of cerebral irritation. The patient has muscular tremors or spasms, is morbidly taciturn or foolishly loquacious, sometimes actively delirious. The temperature is apt to be elevated, the patient obstinately unconscious, the breathing noisy. It is evident that a very slight increase of these symptoms would convert them into those of compression, coma succeeding to stupor, stertor to mere loudness of breathing, paralysis to convulsions. 4. Laceration of the brain, if not followed at once by sufficient hemorrhage to produce apoplectiform symptoms, is characterized by great restlessness, wild delirium, with moans or shrieks, general convulsions, and finally by the motor and sensory phenomena of general encephalitis.

In the treatment of all these conditions the first indication is to keep the patient quiet and at rest. Nearly all the dangers of these accidents from first to last arise from consecutive inflammation, and everything which might conduce to this should be sedulously guarded against. Stimulants, therefore, even during the early stages, should be avoided. Where there is such profound depression as to threaten death, they may be given in small doses—preferably, as spirits of hartshorn or carbonate of ammonium—and should be accompanied by the application of external dry heat, by sinapisms, hot-water bottles, warm flannels, or a current of hot air conveyed beneath the bed-clothing. After reaction has begun, cold to the head, absolute rest in a darkened room, sedatives such as bromide of potassium, a diet chiefly of milk and farinaceous articles, attention to the various secretions, the use of small doses of mercurials, or of an occasional purgative dose, and catheterism, if necessary, are the essentials of treatment. Convalescence in the graver cases is slow, and should be favored by perfect tranquillity of body and mind.

Concussion affecting the spinal cord is probably always associated with some lesion either of the nerve fibres or of the smaller blood-vessels of the cord. The physical conditions are very different from those existing in the skull. There we have a large, inelastic, nerve mass completely filling a dense hollow sphere, to which it is closely connected throughout. Under these circumstances we can understand how force suddenly applied to the cranium may be transferred to its contents, producing great temporary disturbance or disarrangement of their particles. But the spinal cord hangs loosely in a canal extending through a segmented and markedly flexible column, being connected therewith only at the points—the intervertebral foramina—where its membranes are continuous with the sheaths of the spinal nerves. It is evident that an injury producing a violent general shock is much more likely to inflict damage by "concussion" upon the brain than upon the cord, and it is very doubtful whether the latter structure ever suffers in precisely that way.

The symptoms said to be characteristic of succus-

sion or perturbation of the *medulla spinalis*, without recognizable injury to its structure or membranes, or to the spinal column, are numbness, formication, loss of power in the extremities, pallor of the face, general weakness and depression, nausea and vomiting. These, however, may all be due to the shock of the injury, to contusion of peripheral nerves, to disturbance of the sympathetic ganglia, or to other causes independent of the spine or its contents. The secondary results said to follow such injuries are distinctly due to inflammatory or degenerative changes affecting either the cord or the membranes. The chain of causation has never been satisfactorily demonstrated. An individual who sustains a severe shaking-up during a railway collision, or in some other manner, may develop, after an interval of apparent health varying from a few hours or days to two or three months or even some years, a certain group of symptoms referable to his cerebro-spinal system, and in all probability originating at the time of his accident. There is no evidence, however, justifying the assumption that the original trouble in such a case was simply an uncomplicated concussion. By the time death occurs the changes found would of course be those due to long existing disease. In the only carefully recorded case of the kind the signs of spinal meningitis and myelitis were found together with a condition of the posterior columns closely resembling that seen in progressive locomotor ataxia.

The general conclusions warranted by these facts are, 1st, That there is no evidence that uncomplicated concussion of the spinal cord has taken place, while there are good *à priori* reasons for doubting the possibility of its occurrence.

2d, That the symptoms described as following railway concussion of the spine probably originate in some actual though slight involvement of the tissues of the cord or of its membranes at the time of the accident, but in their full development are certainly due to well-recognized and by no means peculiar pathological conditions.

The medico-legal importance of these latter cases, upon which are often founded suits for damages, makes them especially interesting. Among the earliest phenomena observed after the interval of apparent health which has been alluded to is an alteration of the manners or temperament of the patient, who, whatever his original disposition, is apt to become gloomy, morose, and ungracious; defective vision, hearing and speech ensue; the sense of touch is affected, its delicacy being greatly destroyed; muscular movements are irregular, and the gait awkward or unsteady; paralysis of motion and of sensation may supervene, or there may be tremor associated with pricking, burning or tingling sensations. Emaciation, general paralysis, and death usually terminate the case.

Passing from these cases to those in which some definite spinal injury exists, we find that here even more than in the brain it is difficult to dissociate the phenomena of so-called concussion and those of compression or of inflammation. Just as in cases where a serous or bloody exudation has taken place within the skull the symptoms of cerebral irritation pass insensibly into those of compression or of traumatic encephalitis, so in spinal injuries the alteration of sensation and motion and the disturbance of function, sometimes connected with very slight exudations or trifling hemorrhages, deepen into more or less extensive and profound paralysis, or give rise to spasms or convulsions, dyspnœa, retention of urine, fecal incontinence, priapism, and other symptoms of pressure upon or disorganization of the spine. The fact that each segment of the cord is really a distinct nerve centre makes it possible to determine accurately in these cases the exact seat and area of the lesion involved. So, too, the time of appearance and degree of severity of certain symptoms, such as motor paralysis, afford valuable evidence of the amount of involvement of the cord.

If after a spinal injury complete paralysis comes on immediately and persists, the cord is probably divided or compressed by an extensive blood-clot or by a broken vertebra. If it is merely transitory the condition has in all probability been one of slight hemorrhage into the substance of the cord. Such a case might be described as one of simple "concussion," but the term, though convenient, is manifestly inaccurate.

Gradual paralysis, slowly advancing, is due either to continuous hemorrhage from a small vessel or to inflammatory extravasation. It sometimes slowly disappears. If it does not, or if it increases, the inference is that some progressive disorganization of the cord is taking place and will finally cause death.

The treatment of cases of spinal injury in which there is no paralysis consists in rigid confinement to bed, preferably in the prone position so as to favor the gravitation of blood away from the back; the application of ice-bags, hot poultices, or strong counter-irritation along the spine; careful attention to the bowels and bladder, the former being emptied by enemata, and the latter, if necessary, by catheterization; and the administration of small doses of iodide of potassium and mercury. The patient should rest on a water bed, the skin should be kept scrupulously clean, and the parts exposed to pressure often bathed with astringents or with stimulating linimenta. Where paralysis exists, the supine position is preferable, and all these precautions must be even more rigidly observed.

(J. W. W.)

CONDITION, in law, a clause in a contract or agreement which has for its object to suspend, rescind, or modify the principal obligation, or in case of a will to suspend, revoke, or modify a devise or bequest. In real-estate law a condition is a qualification or restriction annexed to an estate, whereby it is provided that in case a particular event does or does not happen, or in case the grantor or grantee does or omits to do a particular thing, the estate shall commence, be enlarged, be abridged, or be defeated.

Conditions are of various kinds. They may be affirmative or negative, copulative or disjunctive, consistent or repugnant, express or implied; all of which are sufficiently defined by their names. Conditions may also be lawful or unlawful. A lawful condition is one which does not contravene public policy or the express provisions of a statute. An unlawful condition is such as is forbidden by law. Unlawful conditions are—1, such as require the performance of some act which is forbidden by law or which is *malum in se*; 2, such as require the omission of some act which the law requires to be performed; and 3, such as tend to encourage such acts or omissions.

Conditions are also either pr
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vested. Conditions subsequent are not favored in law.

By the rules of the common law no person was entitled to take advantage of the breach of a condition subsequent except the grantor and his heirs. If, however, a limitation was annexed to an estate, a third party could take advantage of it. Hence the origin of what are known in real-estate law as conditional limitations, which are in substance conditions after the nature of limitations.

If a condition precedent be unlawful, and therefore void, the estate depending upon it can never vest, and is never entirely defeated. If, on the contrary, a condition subsequent be void, the estate, having once vested, can never thereafter be defeated.

Where performance of a condition was possible at the time of its creation, and afterwards through the act of God has become impossible, the law will excuse it.

(L. L., JR.)

CONDONATION, in general language and sometimes in legal proceedings, is used to indicate a forgiveness of almost any offence; but it is technically applied in law to the forgiveness of only one or two particular offences. In this sense it is a forgiveness of the matrimonial offence of adultery or cruelty, known by the party forgiving to have been committed, on the condition that the party forgiven shall ever afterwards conduct himself or herself properly in the marital relation. The word is usually employed in reference to adultery and is best considered from that standpoint, though it is equally applicable to cruelty. When a husband or wife has been guilty of adultery, the party offended against has generally the right to a divorce from the bonds of matrimony, on the ground that the other party has failed to adhere to the obligations entered into on the marriage. But this right may be given up, if the party so wills, and the husband and wife may agree to live together again. In order to constitute a condonation, however, it is not enough that the party offended shall merely make an offer of forgiveness, in case the offending party will return to the relation of man and wife, but the offer must have been actually accepted and the marital relation re-established; but it is not necessary that the parties shall continue to live constantly together in that relation; as to the husband, at least, it is enough if they have once slept together. The mere fact of living together in the same house of course creates a presumption that the parties have resumed the marital relation, but this presumption will be rebutted by showing that they have occupied different beds. It is considered in law that, where the marital relation is so re-established, there is an implied condition annexed that the party forgiven shall in the future conduct himself properly —with conjugal kindness in all respects—and, in case he or she fails to do so, the original offence is revived and can be alleged as a ground for a divorce. And this is not only so, if the adultery is committed again, the rule is much stronger and the party must in all ways behave himself in accordance with the duties of the relation. Even an offence which is cause only for a divorce from bed and board has been held to be a reviver of an adultery which has been condoned; and

( ) ively slight cruelty will also give the right to
the condonation and reassert the first wrong.
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o live together in the relation of man and wife; thus, the abandoning or long neglect of proceedings instituted for a divorce, and perhaps mere words of forgiveness, are sufficient evidence that the party offended has condoned the offence. The subject of condonation has not been largely the subject of legislation, and the doctrine remains generally as above stated; but its conditional quality has been abolished in a few of our States. (W. M. M.)

CONDOR. See CATHARTIDÆ.

CONEY ISLAND, a seaside resort in the vicinity of New York, is a narrow island, 5 miles long, in the Atlantic ocean, off the S. W. corner of Long Island. It is included in the township of Gravesend, Kings co., N. Y. Coney Island creek, a narrow strait winding through a salt marsh, separates the island from the mainland and connects Gravesend and Sheepshead Bays. The island, according to old records, was once three separate islands, and at another time two; more than a century ago it extended two miles farther than at present, and is said to have abounded in foxes and rabbits. About 1800 it was used for farming and pasture, and cedars were cut from it for building small vessels. The first hotel was built in 1819. Two years later, during a violent storm, the tide rose to a height never since equalled; everything was swept away and the island left almost level and perfectly barren. A turnpike road was constructed from Brooklyn to the island in 1830, and later there was communication by a daily stage as well as by a steamboat to New York city. About 1865 a horse-car line was laid from Brooklyn, and soon a steam railroad followed. But the island did not become a popular resort until 1874, when the Prospect Park and Coney Island Railroad was opened, and capitalists did much to increase the attractions of the place, especially the east end. Six steam railroads now run trains at frequent intervals from Brooklyn and from various points on New York Bay and East River, where connection is made by boat for New York city. Large iron steamboats also leave New York every half-hour for the island. The Park Commission of Brooklyn own 70 acres of land near the centre of the island, with a frontage of 2750 feet on the ocean, and an avenue 210 feet wide and 5½ miles long has been laid out from Prospect Park to the "Concourse" on the island. Near the latter, two large iron piers extend 1000 feet into the ocean, ending in 14 feet of water. The piers have a general width of 50 feet, but one is in part 85, and the other 125 feet wide. They are used for promenades, restaurants, and popular concerts. Brighton Beach Hotel is five stories high and 450 feet long, and near it is a race-course, which for five months of the year is used almost daily for horse-races. The Manhattan Beach Company own 500 acres of land, with an ocean frontage of two miles. They have two large hotels, a marine railway, and an elevated railway running to the centre of the island. During the summer season the railroads carry over 2,000,000 passengers to Coney Island, but few persons stay there more than a day at a time.

CONFECTIONERY denotes a class of preparations in which sugar is a principal ingredient. It comprises all kinds of sugar candies, cream and fancy ices, compotes or stewed fruits, fruit and animal jellies, etc. Two centuries ago the art of making sweet preparations was for the most part confined to apothecaries and physicians, who used sugar and honey to make nauseating medicines palatable, and pharma-

See Vol. VI. p. 228 Am. ed. (p. 256 Edin. ed.).

ceutically, in making syrups, electuaries, etc.; but the preparation of conserves and the compounding of drugs have now become distinct arts, though the separation is not entirely complete, the drug trade being dependent on the manufacturing confectioners for what are usually called medicated candies. Of these there are upward of a hundred varieties, chiefly in the form of drops and lozenges, and containing many of the standard medicines. Thus we have cachou lozenges, quinine lozenges, anti-bilious lozenges, cough drops, bronchial troches, etc. These goods are manufactured in very large quantities.

Confectionery is usually classed among the luxuries, but in the United States custom has rendered some forms of sweetmeats indispensable adjuncts to the fashionable dinner and lunch, thus placing them in the rank of articles of diet, and their use is becoming common among all classes. Many causes have contributed to this result, such as the custom of making gifts of boxes of candy at Christmas and other holiday seasons, the multifarious forms which modern confectionery has assumed, the variety of materials introduced into their composition, and the skill and attention devoted to the delicate task of flavoring them. They are thus made to conform with every taste and appetite.

Few industries have experienced more radical changes during the last thirty years. Up to the year 1851 boiled sweets were almost exclusively an English specialty, and it was the novel display in this line of the London confectioners, at the first International Exhibition of that year, that led to their introduction into other countries. The Germans appear to have been the first, or at least the foremost, to emulate the example of their insular rivals, and so well did they improve the occasion that in the Exhibition in 1862 two confectioners from across the Rhine created no little surprise by their superior display of boiled sweets and rock candies. The French artists in sugar have not developed any special skill in this branch, but have devoted themselves assiduously and with surprising success to the manufacture of chocolate and sugar bonbons, liqueurs, pastilles, and comfits, in all of which they greatly excel. In the United States, less than forty years ago, confectionery, both as an art and a business, was in a very crude state. With few exceptions, each confectioner was his own manufacturer, and his stock in trade was limited to the common varieties of stick candy, plain sugar-plums, sugared seeds, and molasses candy. Candied fruit was only made "to order," and was sold at $2.50 per lb. All the fancy goods were imported from France, chiefly from Paris. In the more pretentious stores of those days the rear portion was fitted up as a saloon-parlor, where cake and ice-cream, cold meats, tea and coffee were supplied to customers. For parties, ice-cream was served only in the form of plain pyramids, the moulds being delivered in long, painted tin pails. In the workshop, too, simplicity prevailed. The tools and utensils were of the most primitive style, such as the hard candy kettle and brick furnace, the finger gauge, the old mortar and pestle.

In all these respects there has been a complete revolution. To the plain candies mentioned above have succeeded the dragées, patées, nougats, pastilles, fondants, *fruits au sucre* and *liqueurs sucrés* of the modern confectionery art. Chocolate occupies a prominent place, and is produced on a very extensive scale and manipulated into an endless variety of forms, giving employment to hundreds of workmen, requiring special machinery and great skill in casting the subjects, glazing and covering them. Among the most popular types are figures of fruits, vegetables, spiders, and other smaller insects, made in moulds of hammered sheet copper. Powdered sugar, beaten with the white of eggs, also enters largely into confectionery, the composition being stamped, or cast in moulds. The excellence of these productions is largely due to mechanical improvements in triturating and grinding the materials. In the class of goods known as nougats, the kernels of nuts, especially of almonds, are incrusted with honey. The patées and pastilles, also, are a favorite specialty, and they call for great ingenuity and skill in the intricate interlacing of the fruits, and in the crystallizations. Preserved sugared fruits and fruits in syrup are now important articles of diet, and they include all the favorite products of the orchard, marmalades and jellies. Much attention is given to fruits in jellies and *liqueurs sucrés*, the latter being graded according to quality. The low grade has about 20 per cent. of sugar and glucose, and the same proportion of alcohol, the remainder being water. A finer quality contains 40 per cent. of sugar and 30 per cent. of alcohol, and the highest grade 50 per cent. of pure sugar and 30 per cent. of alcohol. This class includes spirituous bitters, such as absinthe, *elixir de longue vie*, vulneraire, etc., which have been brought to great perfection in France. American confectioners manifest their superiority chiefly in the manufacture of comfits, containing fruit essences, candied fruits, preserves and jellies; in cocoanut cakes, bars, biscuits, and paste, stick candies, caramels, gum drops, and walnut candy. Most of the above are of American origin. Comfits have been brought to great perfection during the last ten years, owing to the introduction of machinery in their production. In the days of the old copper pan, fifty pounds of well-finished comfits or dragées were considered a full day's work, whilst at the present time a skilled workman can superintend a dozen revolving steam-pans, capable of turning out from three to four tons a week. The new system has not only cheapened production, but is much cleaner than the use of fire-heat, and is attended with less risk of fire. These advantages have thrown the manufacture into few hands, who make this class of goods a specialty. The new comfit or dragée pans are made either to oscillate or revolve, both forms being equally suitable for the purpose. In the packing and wrapping of confections great taste is displayed, the style of boxes used being an important item in the make-up of the bon-bons. The manufacture of boxes and other goods of this class is a separate industry, and of late years has grown into large proportions. Steam-appliances are in use in all large establishments, as well as benches, containing six, eight, and even ten machines, with rollers of various patterns, all set in gear. Each of these machines is provided with a lever and clutch wheel, so that one or all can be worked at once. Then there are machines for beating, kneading and mixing materials; for cutting, chopping, and slicing; for grinding, rolling, and grating; ice-crushers, cream-freezers, corking machines for bottling fruit juices and preserves, revolving ovens, steam-kettles, the saccharometer for testing sugar, etc., etc. These contrivances effect a vast economy in time and labor, as compared with the old methods. Twenty years ago, for instance, it was quite an exploit to cut a seven-pound boil of acid drops with scissors and round and

press them flat in half an hour, whilst with the machine now in use a boy can do the same work and turn out the goods in better shape in five minutes. These improvements cover all the details of the laboratory, except where hand-work is indispensable to the quality of the goods, and have completely revolutionized the business. The quality of standard goods is greatly improved, necessitating corresponding changes in classification. Articles which a few years ago were imported from Paris or Vienna are now manufactured here in excess of the home demand, and are being exported to London and to Central and South America. Even ornamental work which a few years ago was prepared only by Parisian confectioners has become a home industry, the importations being mostly confined to samples. In pastillage work there are at least two hundred hands employed in the United States, chiefly in New York and Philadelphia. The product is shipped to all parts of the United States and the British Provinces.

In the management of the mercantile parts of the business the same progress is everywhere perceptible. Stately warehouses, filled with an almost endless variety of goods, and crowded manufactories attest the magnitude of the wholesale branch of the business, whilst handsome retail stores, with their bewildering display of confections in every conceivable style and form, give equal evidence of the increased popular demand. The retail branch, in the leading establishments, is usually divided into four departments, viz.: the candy, the cake and ice-cream, the outside orders, and the restaurant or café. The latter is conducted on a more or less extended scale, the bill-of-fare often comprising fifty to sixty kinds of cake and twenty to thirty varieties of ices. For party orders the latter are served up in plain and fancy bricks, in melon moulds or other elaborate designs, with or without fruit ices, colored and set in spun sugar.

As may be expected, competition among the trade has led to numerous frauds and adulterations in materials used, in order to cheapen production. Baking powder, which is used in many kinds of confections, is often found to contain starch and alum. Ultramarine is sometimes employed in adulterating sugar and saccharine preparations, to offset the yellow color of inferior grades of sugar; cotton seed, walnut, and chestnut oils are sold for olive oil. Oil of lemon, as well as others, are adulterated with fixed oils and alcohol, and sometimes with turpentine, the latter being difficult to detect on account of its similar composition and specific gravity. Chocolate is often mixed with starch, wheaten flour, and other articles, and glucose is made to do duty for sugar in making caramels. Gelatine and glue often find their way into gum goods, especially those known as "A. B. goods," starch into lozenges, lard into chocolate; terra alba, or plaster of Paris, is used in adulterating candies solely to increase their weight, and certain much more dangerous chemicals are sometimes used in coloring candies. The most of the above-named adulterants are comparatively harmless, and their introduction is mainly due to the popular demand for cheap candies; but certain coloring matters are positively pernicious, and their use deserves the severest penalties.

is the base of all confectionery, and it therefore
in importance among the materials used by
There are two kinds—namely, the natural
the cane, sugar beet, maple tree, and a few
and glucose, or grape sugar, which, as

known to commerce, is artificially produced from starch by the action of sulphuric acid. Glucose is undoubtedly destined at no distant day to become a prime factor in the confectioner's economy. Glucose differs from cane sugar in not being readily crystallizable, and also in the smaller yield of sweetness. Its great value in the confectionery art consists in the fact that when added in the proportion of seven to ten per cent. to cane sugar, and boiled with it, it destroys the tendency of the latter to return to the crystallized form; in other words, it removes the grain, and thus dispenses with the employment of cream of tartar or acids for this purpose. On this account it is extensively used in the manufacture of "A. B. gum goods," lozenges, "kisses," cocoanut preparations, and creams. It also gives to cream and pulled candy a certain waxiness—a desirable quality—and adds to the keeping properties of caramels, cough candies, and clear fruit drops, all of which have a tendency to become sticky when exposed to the air. Though its introduction has encountered much opposition, on the ground that it is an unhealthy adulterant, it is now conceded by competent chemists to be harmless and even nutritive; whilst in making confections of the class referred to above it is decidedly an advantage when not used to the comparative exclusion of cane sugar. American glucose is made from corn, and has been greatly improved of late by being thoroughly freed from the sulphuric acid with which it is prepared. In Europe there are some ninety glucose factories, but there it is produced from potatoes. That manufactured in France stands higher in the market on account of its being freer from acid; but it does not appear to possess any more sweetening power than the products of the United States or of Germany. On the other hand American glucose has the advantage of being fifty per cent. cheaper.

One of the first requisites in the successful production of confectionery on a large scale is a knowledge of the chemistry of sugar, and of its treatment for the various purposes to which it is to be applied. Pure cane sugar melts at a temperature of 320° Fahr.; crystallized glucose, or grape sugar, at 187°; and the anhydrous, or glucose proper, at 270°. When sugar and glucose are mixed the point of melting will depend on the proportion of each to the mass; and it is in calculating this relation in each case that the art of sugar- and of course candy-making largely consists. The next step is to ascertain the amount of boiling needed to bring the sugar to the proper condition, and this varies with the class of goods to be made. Where pure cane sugar alone is used, the following degrees serve most purposes: 1. The *Smooth*. This degree is reached at 215° to 220° Fahr., and is ascertained by immersing the thermometer in the pan. At this point the sugar is used for crystallizing creams, gum goods, and liqueurs. 2. The *Thread*, at 230° to 235°, for making liqueurs. 3. The *Feather*, at 240° to 245°, for making fondants, rich creams, cream for chocolates, and fruit-candying. 4. The *Ball*, at 250° to 255°, for making cocoanut-ice, cocoanut, and other nut candies, and most grained sugars. 5. The *Crack*, at 310° to 315°, for making all kinds of drops, toffees, rocks, and all clear goods. There is also the *Caramel*, at 320°, used for making confections of that name. This is the highest point at which sugar can be kept on the fire without burning. Where refined sugars are to be used it is of the greatest importance to know that when boiled above the *Ball*, or 250 degrees, they are

grainy, and when turned out of the pan and allowed to cool will be simply hard-candied sugar, unfit for further use. To prevent this the grain must be "cut" by the addition of cream of tartar. This ingredient makes the sugar pliable when hot, and transparent when cold; and hence its use for making drops, rocks, toffees, and clear goods. The usual proportion of this ingredient is ½ oz. to every 8 to 10 lb. boil of sugar. Glucose is equally effective in preventing crystallization, and being harmless, and at the same time cheaper, it is rapidly displacing cream of tartar.

According to the census returns of the Bureau of Statistics there were in 1880 in the United States and Territories 1450 manufacturers of confectionery, with a combined capital of $8,486,874, employing 6157 male adults, 2827 adult females, and 817 children, or a total force of 9801. The amount paid annually in wages is $3,242,852, for materials $17,125,775, and the value of the products for that year is put down at $25,637,033. A comparison of the States shows that New York takes the first rank, her proportion being 25 per cent. of the whole, and Pennsylvania second, with 20 per cent., the two combined containing nearly half the establishments of the entire country, and holding the same relation as to the value of the products. Massachusetts, Illinois, Ohio, Missouri, and Maryland come next in the order named, but in these States the production, as compared with New York and Pennsylvania, is largely in excess of the number of establishments, owing to the fact that the business is chiefly centred in a few cities, such as Boston, Chicago, St. Louis, and Baltimore, where it is conducted on a very large scale by comparatively few houses. The returns from twenty of the leading cities of the Union show an aggregate production of $17,921,929, or nearly 70 per cent. of the entire country. Among these cities New York heads the list, having 187 establishments, and showing a production of $4,592,622. Philadelphia follows with 173 establishments and a production valued at $2,653,074; Chicago third, with only 24 factories and a production valued at $1,953,558, and Boston fourth, with 33 factories and producing goods estimated at $1,606,214, the next in order being St. Louis and Baltimore. Imposing as these figures are they are quite misleading as to the real magnitude of the business. They take no account of the foreign goods consumed here, or of the large amount produced by small dealers and retailers in all sections of the Union. Thus, for instance, the local statistics of Chicago show that the sales of confectionery in all its forms during the year 1880 foot up a valuation of $3,000,000—two concerns alone doing a combined business of over $2,000,000 a year. This is a fraction over the whole production of the 27 establishments accredited to Chicago in the United States Census for that year. The same remark applies to New York, Philadelphia, and all other large cities similarly situated.

Though the consumption of confections is pretty well distributed over the Union, it appears that the largest share compared with population is found in that part of the West bounded east and south by the Ohio River, and west by the Mississippi. Nor is this matter of taste confined to the mere element of quantity. Whilst the people of the United States have a strong affinity for sweetmeats of some kind, and consume more than any other nation in the world, they are equally fastidious in their choice of goods. What suits one section is unpopular in another. This diversity of popular taste is particularly noticeable in the choice of flavorings. Thus, in the North, winter green is most in favor; in the South peppermint, whilst in the Southern seaboard States a decided preference is shown for sassafras.

One peculiar feature of this important industry in the United States is that there is no local specialty in any city or section; for though many of the most popular goods had their origin in the inventive brain of some individual, and for a while the inventor was able to guard the secret, it was soon discovered and imitated. The "A. B. gum-drop," for instance, is said to have been first introduced to the trade by a German confectioner of New York city a few years ago; cocoanut caramel and walnut candy in Philadelphia by a German and his wife about the year 1869, and "soft Imperial pan-work" by a manufacturer of New York city in 1868. All these and many other standard goods of purely American origin are now made by confectioners everywhere: the only distinction recognised being based on the real or supposed superiority attached to the individual brands. In the manufacture of machinery and tools used by confectioners circumstances have combined to create specialties in certain lines. Thus Philadelphia is conspicuous among the large cities of the United States as the headquarters for machinery, tools, and most utensils used in the trade, a branch of industry which is carried on here on a more extensive scale than in any other city. New York city, in the same way, enjoys a monopoly of the copper work used by manufacturers, whilst all the delicate machinery used for making chocolate is imported from France, where it originated.

Among the causes which have led to the remarkable growth of this industry is, first, the general introduction of machinery and implements, which, besides enlarging the productive capacity of the numerous establishments, has improved the quality of the goods; secondly, the rapid increase in the population of the country; thirdly, the general prosperity of the country. In Europe the laboring classes cannot afford to indulge in luxuries of any kind, and least of all in sweetmeats; and hence confectioners are driven to depend for their support and patronage on a very small fraction of the populations of the respective countries. In the United States, on the contrary, the industrial classes are by far the largest consumers. Lastly, the low prices at which confections are sold being the result of cheap production as compared with Europe, h
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confectionery goods are made by the ton, and often sold in single orders ranging from ten to fifty barrels each. Transactions on a similar scale are entirely unknown in any other country in the world. To sum up in a single sentence, the confectionery industry of the United States has already attained vast proportions, its development is steadily onward, and its possibilities in the future practically unlimited. (E. H.)

CONFEDERATE STATES. The organization of the "Confederate States of America" in 1861, as an independent government, is now commonly regarded as the result of a conspiracy, for the reasons which follow. A distinction may be properly made between secession, the withdrawal, or attempt to withdraw, from the National Union, and the organization of the Confederate States. The former was only an abnormal development of the particularist side of American politics, brought to a head by the sectional differences caused by negro slavery. The particularist notion that the union was a league, a "voluntary association" of States for mutual benefit, was extremely common everywhere until after the end of the war of 1812, though its corollary, the right of secession, was either unthought of or kept out of sight, except in such isolated instances as the Virginia and Kentucky resolutions of 1798, from which it may perhaps be drawn by argument, and Tucker's edition of Blackstone's Commentaries in 1803, in which it is completely formulated. There was very little national feeling at any time, and it is hardly too strong an assertion to say that the national government owed its continued existence during this period to its control of the great western territory, in which States and individuals had a common interest. After 1815, the national idea grew rapidly and increasingly in those States in which slavery had ceased to exist, (1) because of the growth of manufactures, banking, commerce, and other interests which ignored or were embarrassed by State lines; (2) because of the rapid internal transfer of population to new States without historical associations; and (3) because of the increasing influx of foreign immigrants, who sought and thought of only the United States, not a particular State. From all these influences, with the possible exception of the second, the South was completely shielded by slavery, and the idea of State sovereignty remained as strong there as ever. Indeed, by a reactionary movement, it had grown stronger in 1860 than in 1787–88, and community of interest had given it the more dangerous character of sectional sovereignty. But, though the two sections were thus drifting apart, the political vocabulary of the North and West remained unchanged, and such phrases as "the confederacy" and "the voluntary nature of the Union" were very frequently used by men of all parties, who either forgot that they implied a right of secession, or did not see that they had already collapsed under New England's experience before and during the war of 1812, and that unseen physical forces had given the Union a stronger than "voluntary" character. Even the idea of secession, for which the way had been paved by consistent theory in one section and by a survival of political phrases in the other, was not at first generally terrible in 1860–61, for there was a vague feeling that the process, however extraordinary, was nothing more than a final summons to the other States to compromise national difficulties. Even after the formal inauguration of the Constitution in March, 1789, two States, Rhode Island and North Carolina, had for considerably more than a year refused to ratify the Constitution, or take part in the government; and yet their troublesome independence had been submitted to by the other States until "voluntary" ratification ended the difficulty. In 1861 there were some far-seeing men in the North and West, like Gov. Andrew, of Massachusetts, who ordered arms and prepared for war; there were others, like Seward, who looked to Canadian annexation to make good a confessed loss; but to the great mass of the people the status of South Carolina and the other seceding States seemed quite on a par with that of Rhode Island and North Carolina in 1789–90. Neither in 1789 nor in 1861 was there any definite idea of the method by which the problem was to be solved; but in both cases there was the same reliance on natural forces, the same characteristic American confidence that the solution would be reached "somehow." And in the South the feeling was generically similar. We have the emphatic testimony of a competent observer, Alexander H. Stephens, that the "wavering scale" in the essential State of Georgia was turned by one cry, "We can make better terms out of the Union than in it." It was hard, at the best, to carry a majority of Southern voters into secession, with all its vague idea of only a temporary suspension of union, and every motive of pride, passion, prejudice, interest, and even terror, had to be invoked to do it. Had the spectre of a Southern national government, and its inevitable war with the United States, been as familiar to Southern voters as to Southern politicians, it is difficult to name any State outside of South Carolina which would have seceded; and we have Gov. Gist's confidential letter to other Southern Governors, in October, 1860, to assure us that South Carolina's secession, without assured support by one or more other States, was "very doubtful." For all these reasons, secession, pure and simple, was looked upon at the North, until very late in January, 1861, as no finality, but as the last desperate effort of a minority to compel some compromise which both it and the incoming administration of President Lincoln would be glad to accept. President Lincoln's inaugural in March, 1861, declaring his intention to collect duties and to continue the mails, "unless repelled," but not "to force obnoxious strangers" into any locality "where hostility to the United States shall be so great and universal as to prevent competent resident citizens from holding federal offices," seems to mark his acceptance of a policy which, impossible as it had then come to be, was at least in the line of the idea which had at first been generally entertained of the design and possible results of secession. But the organization of a new national government by the seceding States was a very different matter. Secession, so long as it looked to individual State action alone, was at the worst a negation of national authority for a longer or shorter period; but here was a distinct affirmation of a new power, whose recognition would end the Union, in its old form, forever. Such an affirmation was desirable only to the politicians, as a means of coercing the allegiance of the doubtful mass of voters. It was made in every case by the State conventions, without reference to or ratification by the popular vote. It was proposed in the first instance by a few great leaders at Washington, whose influence over their respective State conventions was very great. It is not wonderful, then, that the story of a secret meeting of the senators of the seven original seceding States, at Washington, Jan. 5, 1861, of its decision to force

through the organization of a national government, of its appointment of an executive committee headed by Jefferson Davis, and of its dictation of the whole course of procedure, has been accepted by all historians, North and South, without any great search for its authority. It rested originally on an anonymous letter to a Washington newspaper four days after the date of the meeting, but has since been confirmed by several detached items of evidence; and the least that can be said of it is, that it is not at all improbable. It is for these reasons that the organization of the Confederate States government, rather than the antecedent act of secession, is usually termed a conspiracy, the few Washington leaders being the conspirators, and the mass of Southern slave-owners and politicians being rather active supporters than admitted participants.

The event which crystallized the theory of secession into practice was the election of President Abraham Lincoln in November, 1860. While the United States extended only to the Mississippi, the Ohio furnished a safe boundary between new slaveholding and non-slaveholding States. When migration passed the Mississippi, the dividing line was lost. Louisiana, when acquired in 1803, was a slaveholding territory by French and Spanish law, and Congress took no steps to prohibit slavery therein. Consequently slavery spread over the intervening Territory of Arkansas into Missouri, which was a slave State when admitted in 1821. With its admission was coupled a proviso prohibiting slavery for the future in the remainder of the Louisiana purchase, north of latitude 36° 30′. The whole was known as the Missouri compromise. When California, Utah (including Nevada), and New Mexico (including Arizona) were acquired from Mexico in 1848, a conflict between the two sections, so much stronger in wealth and population, was a more serious matter than in 1821.

After a struggle of more than two years, the compromise of September, 1850, admitted California as a free State, ignoring the question of slavery in Utah and New Mexico, and gave the South a more stringent fugitive slave-law. This last item proved highly unpopular in the North and West, but was submitted to. In 1854 the Territories of Kansas and Nebraska were organized. Both were part of the Louisiana purchase, and north of the line of 36° 30′, and hence were free territory by the Missouri compromise; but, most unfortunately, the Northern Democratic leaders conceived the idea that political consistency called upon them to follow the same plan with Kansas and Nebraska as with Utah and New Mexico. The result was the passage of the Kansas-Nebraska bill, which effusively proclaimed its neutrality as to slavery, and thus repealed the Missouri compromise, with its prohibition of slavery. The secondary results never stopped short of war. The Republican party was instantly organized, its leading tenet being the right and duty of Congress to prohibit slavery in *all* the Territories. In the struggle, 1855–58, between pro-slavery and anti-slavery settlers for the control of Kansas, the former were defeated, in spite of the Dred Scott decision in 1857, in which the Supreme Court affirmed the constitutional existence of slavery in a Territory, whenever an owner should see fit to carry a slave thither. In 1860 the National Democratic party split into two sections, and Lincoln and Hamlin were elected, having a majority of the electoral and a minority of the popular vote. Their election was the signal for action. The South Carolina Legislature, which was in session to choose presidential electors, called a State Convention. It met Dec. 17, unanimously adopted an ordinance, Dec. 20, repealing the State's ratification of the Constitution in 1788, and dissolving "the union between the State of South Carolina and other States under the name of the United States of America." Its declaration of causes for secession was extremely meagre. It consisted mainly of an argument for the abstract right of secession; and the causes were but two—one general, a loss of the identity of interest between the North and South which had made the Union possible, and one particular, the passage of "personal liberty laws" by Northern States, intended to secure the privilege of the writ of *habeas corpus* to alleged fugitive slaves. In the other Southern States the process was closely similar, omitting the declaration of causes. In this manner ordinances of secession were passed by the State Conventions of Mississippi, Jan 9, 84 to 15; Florida, Jan. 10, 62 to 7; Alabama, Jan 11, 61 to 39; Georgia, Jan. 19, 208 to 89; Louisiana Jan. 25, 113 to 17; and Texas, Feb. 1, 166 to 7. The ordinance was submitted to the people for ratification in but one State, Texas, and there only because the convention was an entirely revolutionary body, called by private persons, the Legislature not being in session, and it needed some vestige of authority.

The act of secession, though only a stepping-stone, was a most important one. Under the State sovereignty theory, the primary allegiance of the citizen was due to the State, and his obedience, or secondary allegiance, to the Union of which his State was a member. By the dissolution of the Union the allegiance of the citizen was due only to the State, whose sovereignty was represented now by the conventions. These did not finally adjourn after the act of secession, but, by concert of action, elected delegates to a Congress at Montgomery, Ala., Feb. 4, and continued in existence. The "provisional" Congress, of one house, met at the time and place appointed, though the Texas delegates were not appointed until ten days later. Each State had one vote. A provisional constitution, being that of the United States with some changes, was adopted, 1 8; and Jefferson Davis, of Mississippi, and Alexa H. Stephens, of Georgia, were elected pro president and vice-president on the following day inaugurated Feb. 18. Having ratified the pro and permanent constitutions, and ing ferred the "secondary allegiance" new national government, the State Co at last able to adjourn *sine die;* the m part of their work was accomplish E Congress of the United States. in ton, had been engaged in di reconciliation and reunion, the unity of the nation, an organized arisen at Montgomery, able to levy support navies, make treaties, peace, above all, demand the allegiance of its a war against the United States. In all unconditional secessionists enthu while the mass of the voters had over the action of the State Conventi had so rashly called into being. sometimes the official action of State sometimes the unofficial action of mo indorsed by officials, had lo precede tion of war, or even the Forts, arsenals, custom-hou hospitals, and mints, had

State authorities; and United States troops had forced to surrender, paroled, and sent North. lent Buchanan declared in his messages to Con- hat he saw no legal method to check or punish long as Federal judges and marshals in the ...States continued to resign, and no persons could ...ound to take their places. Even when the South ...arolina batteries, Jan. 9, fired upon and drove back United States vessel which was endeavoring to pro- sion Fort Sumter, in Charleston harbor, the Federal ...vernment showed no disposition to accept the act as ... of war. Nominally, President Buchanan suc- ed in "keeping the peace" until the end of his ...inistration; but when President Lincoln took e, March 4, 1861, he found that every vestige of ...eral authority in the seceding States had disap- cept at Fort Pickens, in Florida, and Fort ..., in South Carolina. To allow both of these to ... to make the Confederate government the un- cessor to the Federal government within ... territory claimed by it; to allow either to go was ... hazard the whole result upon a single die. Seward, ... of State, was against any attempt to pro- ... forts, trusting thus to confine the rebellion ... ...en seceding States, retain the border States ... Union, and supply losses by Canadian annexa- ...ns. Early in April he was at last overruled, and attempt was made to provision Fort Sumter. ...ore this could be effected, the Confederate batteries ...d forced the fort to surrender, April 12–14, and war begun. April 15, Lincoln, by proclamation, an- ...nced the existence of the rebellion, and called for ...000 volunteers to suppress it; two days afterwards ...n Davis offered letters of marque and reprisal to ...ate armed vessels against the commerce of the ...ited States, and privateers at once began to issue ...m Southern ports; and on the 19th President Lin- ...ln declared a partial blockade of Southern ports, ...hich was made general on the 27th. May 6, the ...derate Congress passed an act recognizing the ...nce of war with the United States, and foreign ... immediately began to declare their ... ...ween the two belligerents. One im- ... result of the outbreak of hostilities was an ... ...n of the area of secession. The border States ...re willing to remain in the Union, at least tempor- ...y, so long as its voluntary nature was recognized; the first attempt at "coercion" drove most of into secession. Their governors refused to obey ... for troops, summoned their legislatures in ... session, and thus obtained the State Conven- ...ns which the legislatures had hitherto refused to ...thorize. Ordinances of secession were thus passed, ... to 55, by the Virginia Convention, April 17, which ... hitherto refused to secede; by the Arkansas Con- ...ntion, May 6, 69 to 1; and by the North Carolina ...nvention, May 21; and all these conventions pro- ded to ratify the provisional constitution and enter ... Confederate States. The Virginia Convention ... embarrassed by a popular majority of about ...,000. directing any ordinance of secession to be ...tted to popular vote. The convention, ..., took the extraordinary course of con- ...ing a "military league" with the Confederate April 25, thus allowing Confederate troops to over the State, so that the "popular vote" ... became a mere farce. The Tennessee politi- ...ans ... ...e swift and more radical in following the The legislature itself formed the military league and prepared the ordinance, May 7, which was similarly ratified by popular vote, June 8. In Missouri the State government was secessionist, but the State Convention adjourned in March, refusing to secede. Before it reassembled, July 22, the State government had undertaken war on its own account, had been beaten, and had been driven out of the State. The Convention proceeded to vacate their offices and order a new election, which gave the Unionists control of the State; but the fragments of the old legislature undertook to pass an ordinance of secession, of its own power, and enter the Confederate States. In Kentucky the governor at first attempted to exclude both Federal and Confederate troops from the State; but the Union majority of the State, though always pro-slavery, fought secession with uncommon vigor, and never lost their undisputed control of the State legislature and government. Nevertheless, representatives from particular districts in Kentucky, or from Kentucky regiments, were admitted to the Confederate Congress. In Maryland the whole burden of resistance to secession was thrown on the shoulders of one man, Governor Hicks. The secession of this State in Feb., 1861, would have enormously increased the chances of foreign recognition and the dangers of the situation, by installing the Confederate government at Washington as the *de facto* successor of the United States government. Governor Hicks held the key; no convention could be called but by the legislature, and the legislature was not in session and could only be summoned by the governor. In spite of an attempt to organize a revolutionary convention in February and March, like that of Texas, he staved off the meeting of the legislature until April 26, yielding then on finding that the legislature was preparing to meet without his summons, but using his prerogative to call the meeting at Frederick, in the Unionist district of the State. By this time Maryland had become a highway for Federal troops in motion toward Washington, and the danger of a revolutionary secession was over. In Delaware there never was any danger; in January the legislature had almost unanimously declared its "unqualified disapproval" of secession and the organization of a Confederate government. Before the meeting of Congress, July 4, 1861, the lines were fairly drawn. The northern boundary of the Confederacy was a line following the Potomac to its head-waters; thence S. W. to Tennessee; thence W. along the northern boundary of Tennessee and Arkansas; and thence S. W. through Indian Territory and along the western boundary of Texas to the Rio Grande. Some forty counties of Western Virginia, repudiating the ordinance of secession, held a State Convention at Wheeling, June 11, vacated the positions of State officers, and provided for an election of a new State legislature. This body gave the formal consent required by the Constitution to the erection of a new State within the limits of Virginia; and the new State of West Virginia was admitted to the Union, June 19, 1863. To counterbalance this loss, the Confederacy had treaties with most of the tribes of the Indian Territory, from which it drew recruits, and had possession of the southern tier of counties in Kentucky and Missouri, to which States it had an inchoate claim, to be perfected, it hoped, at the conclusion of a treaty of peace.

The provisional constitution was to continue in force one year. The permanent constitution was adopted by the provisional Congress, March 11, 1861, and was ratified by the State Conventions, or legislatures, before April 29. It

followed the Constitution of the United States very closely, even in form, the following being the most important changes: It formally recognized State sovereignty; used the words "slaves" and "slavery" instead of the various euphemisms of the Constitution; gave the cabinet seats without votes, in Congress; lengthened the term of the President and Vice-President to six years, and forbade the re-election of the former; allowed the President to veto single sections in appropriation bills; forbade Congress to vote money for internal improvements, to pass protective tariffs, or to grant bounties; forbade removals from office, except for dishonesty, incapacity, inefficiency, misconduct, or neglect of duty, the reasons to be reported to the Senate; and directed Congress to recognize and protect in the Territories "the institution of negro slavery as it now exists in the Confederate States." The first Presidential and Congressional election under this Constitution took place Nov. 6, 1861. Davis and Stephens were chosen to the respective offices then held by them, and were inaugurated Feb. 22, 1862, to serve until 1868. At the same time the provisional Congress of one house gave way to the permanent Congress, in which thirteen States were represented, Stephens presiding over the Senate, and Thomas S. Bocock, of Virginia, over the House. The Senate numbered 26, two from each State, the most distinguished members being C. C. Clay and W. L. Yancey, of Alabama; B. H. Hill and H. V. Johnson, of Georgia; A. G. Brown, of Mississippi; Wm. A. Graham, of North Carolina; R. W. Barnwell and James L. Orr, of South Carolina; Wm. S. Oldham and Lewis T. Wigfall, of Texas; and R. M. T. Hunter and Allen T. Caperton, of Virginia. A full House consisted of 106 members, as follows: Alabama, 9; Arkansas, 4; Florida, 2; Georgia, 10; Kentucky, 12; Louisiana, 6; Mississippi, 7; Missouri, 7; North Carolina, 10; South Carolina, 6; Tennessee, 11; Texas, 6; and Virginia, 16. The delegations from Kentucky and Missouri were fictitious and only submitted to as a basis for ulterior claims, but they disappeared in 1864. The sessions of Congress were as follows: *Provisional Congress:* (1) Feb. 4 to March 16, 1861; (2) April 29 to May 22, 1861; (3) July 20 to Aug. 22, 1861; (4) Nov. 18, 1861, to Feb. 17, 1862. *First Congress:* (1) Feb. 18 to April 21, 1862; (2) Aug. 12 to Oct. 13, 1862; (3) Jan. 12 to May 8, 1863; (4) Dec. 7, 1863, to Feb. 18, 1864. *Second Congress:* (1) May 2 to June 15, 1864; (2) Nov. 7, 1864, to March 18, 1865. The cabinets, provisional and permanent, were as follows, the dates being those of appointment: *State Department*—Robert Toombs, Ga., Feb. 21, 1861; R. M. T. Hunter, Va., July 30, 1861; Judah P. Benjamin, La., Feb. 7, 1862. *Treasury Department*—Charles G. Memminger, S. C., Feb. 21, 1861; James L. Trenholm, S. C., June 13, 1864. *War Department*—L. P. Walker, Miss., Feb. 21, 1861; Judah P. Benjamin, La., Nov. 10, 1861; James A. Seddon, Va., March 22, 1862; John C. Breckinridge, Ky., Feb. 15, 1865. *Navy Department*—Stephen R. Mallory, Fla., March 4, 1861. *Attorney-General*—Judah P. Benjamin, La., Feb. 21, 1861; Thomas H. Watts, Ala., Sept. 10, 1861; George Davis, N. C., Nov. 10, 1863. *Postmaster-General*—Henry J. Ellet, Miss., Feb. 21, 1861; John H. Reagan, Texas, March 6, 1861.

This article does not have to do with the military or naval history of the Confederate States, and from any other point of view its career is but a sorry picture. Its political history is almost an absolute blank, its diplomatic history a series of failures, and its financial history a series of blunders. Such a record demands explanation, and most Southern and Northern writers have found it in the wrongheadedness, meddlesome inefficiency, and obstinate favoritism of President Davis. Some Southerners have not scrupled to express a willingness to enter the conflict again if the Presidents could be exchanged. It must be admitted that Davis' errors were unpardonable. And yet it is hard to trace all the civil misfortunes of the war to him as their only source. A more silent but constantly working influence seems to have been the system of negro slavery and its impression on the political life of the people. For their ninety of S all their civil honors, all their and in practical government, h single class of slaveholders; a by was an exception, the first use of his wealth was to enroll himself in the the purchase of slaves. No good number of slaveholders in 1860 at What would be the political c numbering 5,000,000, if its who confined to a fraction of 300.000 of i each one of that number co command in the army? W rated his own office far below the wishes, the command of the Confede was to be looked for from subordi tes? exceptions Congress, the State l s, administration generally, be fo petent or unworthy men, a in were left without any reliable sup ception of the provisional governi t Congress were almost continu decision to exclude from who should accept milita permanently of the services of Confederacy. In a legislation of presence of the cabinet was a judgment, and Congress bec ing laws prepared by the ex e. an instance of independent a by C quarrel with Davis in the c h and then its action was undi confined to an unconstitutiona Davis as commander-in-chief. very little weight with Congr F any time. The suspension o extension of the conscription sy ruary, 1864, it embraced in male between the ages of 17 voter in the country at the mercy of subordinates controlled by him, ernment an executive despotism. be unfair to look for any lines of people engaged in what soon attempt at revolution; but there between the political life of the two during the war. In the North two g ties continued their ancestra le cagerness, even down to the the strongest condemnation of suppressed, was still more oft the opposition in C Congress itself, thro cessfully a control o the conduc was often troublesome, but alwa the South, outside of its armies, of death; its Congress was a co with hardly a thought of interference dent's control of the war; there was no gle, excepting a contested election in N 1863, and a symptom of another in 6 and there never was any open down to the instant when the veil and it was found that the popu lacious, and that the people we tired of the war. For such a can be responsible; a clearer e found in the different social tions. For the misfortunes

financial history, on the other hand, the circumstances of the Confederate States seem to have been mainly responsible. In both cases, however, the relentless blockade established by the Federal government was a powerful factor in determining the result, and the possibility of the blockade and its results was mainly due to the same difference of social systems. In the South commerce and manufactures had been practically impossible with involuntary labor, for the inevitable waste of such a system cut off the small margin of profit. There was therefore no ability to resist the blockade, and, under the blockade, no resource for the government but a grinding system of direct taxation. Both sections appealed to the help of issues of paper money. But in the North the customs revenue was enough to ensure the interest of the public debt, and the whole was supplemented by a high internal revenue tax, mainly on manufactures, which has produced nearly $3,000,000,000 up to 1882; and gold was thus prevented from rising above 300. In the South customs and internal revenue were equally unavailable, and the paper money had no basis except receipts in cotton, which could hardly be sold; gold therefore rose to 120 in December, 1861, to 300 in December, 1862, to 1900 in December, 1863, to 5000 in December, 1864, and to 6000 in March, 1865, when the paper money had become practically worthless. During this depreciation the financial history of the Confederate States is mainly a series of efforts, by taxation in kind, acts to regulate the prices of produce, and kindred expedients, to delay or evade a process which hardly any statesmanship could have delayed or evaded. Before the spring of 1864 the financial system of the Confederate States was confessedly a chaos; and after that point it is perfectly true that the Confederate armies "supported the rebellion on their bayonets" until April, 1865, with hardly the semblance of efficient support from the civil service. Early in March, 1861, [illegible] missioners were sent to the Federal government to [illegible]tiate for the transfer of property to the Confed[illegible] States, and the peaceful settlement of a separa[illegible]. They were finally refused any official hearing. [illegible] commission of three, Yancey, Mann, and Rost, was [illegible] appointed, which was to seek recognition from [illegible]itain, France, Russia, and Belgium; but the [illegible]on was found to be much inferior in efficiency [illegible] ambassadors to individual courts. Such am[illegible], J. M. Mason and John Slidell, were ap[illegible]d to Great Britain and France respectively in the [illegible]n of 1861, and were taken out of the British [illegible] r Trent, Nov. 8, while she was on her way [illegible] a to St Thomas, by the United States [illegible] r San Jacinto. The United States had always [illegible]d against any such practice of search and [illegible] by l ligerent vessels in the case of neutrals, [illegible] to war with Great Britain in 1812 mainly [illegible]. The Federal government was therefore [illegible] by its own precedents to disavow the seizure [illegible] nder the captives. The disappearance of [illegible] of war between the United States and [illegible]ritain neutralized the mission of the ambassadors, though the danger of foreign intervention never wholly disappeared until the idea of intervention had been [illegible] de odious by the beginning of the emancipa[illegible] in September, 1862, and dangerous by the [illegible] the tide against the Confederacy in the fol[illegible]uly. But in the course of the struggle there [illegible]ow [illegible]e from war with Great Britain on [illegible]. The first few Confederate privateers had gone to sea from Southern ports, and had not been very successful. British shipyards were at once made use of by Confederate agents. In March, 1862, the Oreto (afterwards the Florida) put to sea; in July the Alabama followed her; and in April, 1863, and September, 1864, the Georgia and Shenandoah gained the ocean. All these were built, equipped, and manned by British subjects, and their escape was ascribed by her majesty's government to defects in the neutrality laws. This excuse the United States refused to admit, holding that a neutral nation was bound to have efficient neutrality laws; and a mass of grievances, known in the aggregate as the "Alabama Claims," was gradually made up. Early in 1863 a far stronger case came up. It was found that two rams were building at the Laird ship-yard in Liverpool for the purpose of breaking the blockade; while, in the parallel contemporary case of the Alexandra, the Court of Exchequer decided that, under the foreign enlistment act, the selling of a vessel to a belligerent was as proper as the selling of arms. Diplomatic relations were at once tightly strained in appearance. The President informed his representative in Great Britain that, if the law of the Court of Exchequer should be sustained, he would "be left to understand that there is no law in Great Britain which will be effective to preserve mutual relations of forbearance." Earl Russell in Parliament declared, for his government, that the Liverpool builders had "done everything in their power, by fitting out ships, by engaging in contracts for supplying vessels of war to the other belligerent, to give to the United States a just cause of war against this country;" and the calamity of the American merchant marine, under privateer attacks, was a pregnant warning of the certain results of such a war upon British commerce. The whole force of the government was thrown against the builders, who were at last induced, early in 1864, to sell the rams to the British government. The mass of claims against Great Britain, for her lack of "due diligence" in maintaining neutrality, were submitted to arbitration by the treaty of Washington, May 8, 1871; and the arbitrators, sitting at Geneva, awarded a gross sum of $15,500,000 as damages to be paid by Great Britain, Sept. 14, 1872. (See ALABAMA CLAIMS.)

A civil, diplomatic, and financial history of the Confederate States by a Southern authority, and free from feeling, would be most useful and valuable; but it has yet to be written. The nearest approach to it is A. H. Stephens' *Historical View of the War Between the States;* but this is devoted mainly to the preliminary constitutional questions, and leaves the Confederate History almost untouched. Much may be gained from Pollard's unmethodical *Secret History of the Confederacy,* and more from Jones' *Rebel War Clerk's Diary,* and the collection known as *The Richmond Examiner During the War.* Beyond these sources of information there is hardly anything available. Jefferson Davis' *Rise and Fall of the Confederate States* is almost entirely an apology for the life of its author; and the Confederate public documents are not collected, except the *Statutes at Large.* See also Draper's *History of the American Civil War,* which gives details of secession in the border States; Botts' *Great Rebellion;* Bartlett's *Bibliography of the Rebellion;* McPherson's *Political History of the Rebellion;* Moore's *Rebellion Record; Buchanan's Administration;* Cox's *Eight Years in Congress* (for the opposition there); Sterne's *Constitutional History;* Hurd's *Theory of our National Existence;* Spaulding's *Legal Tender Paper Money;* Schuckers' *Life of Chase; Reports of U.S. Secretaries of the Treasury; Diplomatic Correspondence,* 1861-72; Cushing's *Treaty of Washington; Case of the United States; Case and Counter-Case of Great Britain.* (A. J.)

CONFEDERATION, ARTICLES OF. See CONGRESS OF THE UNITED STATES and CONSTITUTION OF THE UNITED STATES.

CONFESSION, in law, a voluntary declaration made by a person who has committed a crime or misdemeanor of the agency or participation which he had in the same.

Confessions are either judicial or extra-judicial. A judicial confession is one made before a magistrate or in court in due course of judicial proceedings instituted against the person confessing in order to convict him of the crime. All judicial confessions are conclusive as against the parties making them. An extra-judicial confession is one not thus made before a court or magistrate, is not necessarily conclusive as against the party making it, and must be proved on the trial like any other fact in the case.

Confessions may in certain cases be inferred from silence or conduct, or they may be verbal or in writing. Where they are in writing they are invested with a peculiar weight, and almost invariably suffice to convict the prisoner.

In order to render an extra-judicial confession admissible in evidence it is absolutely essential that it should be in its nature voluntary. If, therefore, it has been extorted by threats or by authoritative statements that in case of confession the party shall be exempt from punishment, it is inadmissible. But a mere adjuration to speak the truth or advice to do so, the mere holding out of an expectation of compromise or assurance of secrecy as to the facts disclosed, or the mere fact that the confession was made under oath, will not render it inadmissible. Neither will the fact of its having been made to a person in authority necessarily exclude it. All these circumstances may, however, when taken in connection with others, go to show that the confession was made under some duress or restraint; and where such is the case it cannot of course be received in evidence. It is for the court in every case, and not for the jury, to say whether a confession is or is not voluntary.

Where a confession has once been obtained by means of hope or fear, confessions subsequently made may be presumed to come from the same motive, and are therefore inadmissible, even though no improper influence in obtaining them be shown. But if it should clearly appear that the original influence has ceased to operate the confessions are admissible. Although a confession may not be receivable in evidence because not voluntary in its nature, yet if it be attended by extraneous facts which show it to be true, such facts, together with the confession, are admissible. Thus, where a person, influenced by threats, confesses the commission of a murder and designates the place where the dead body has been concealed, and subsequently the body is found in the place indicated, this confession, though not voluntary in its nature, is clearly admissible, together with proof of the finding of the body.

No *part* of a confession will be received in evidence. The whole must be detailed as it was actually made. Where a confession has been duly made before a magistrate, committed to writing, and signed and sworn to by the party making it, it is the better opinion that no parol evidence as to that confession can be received. If, however, there be any informality about the written confession, such parol evidence is admissible.

A confession can only be used as evidence against a party making it, unless, indeed, the crime in question has been committed by a conspiracy or combination of persons. Where this is the case, and the fact of the conspiracy is first clearly proved, the one of the conspirators is admissible in the rest of them.

CONFISCATION [illegible] the [illegible] of property by the govern[illegible]nt or State[illegible] alty; the seizure of pro[illegible]y as fo[illegible] common treasury. The wo[illegible] *fiscus*, which, meaning origi[illegible] money, came to be used [illegible] common treasury. In [illegible] were almost always forfeited [illegible] crime, and the State may therefore confiscated them. In cases of war the the property of the citizens or [illegible] power, wherever found, has [illegible] this has been the case as [illegible] enemies found within the State's [illegible] tion of war as with property subse[illegible] land or at sea by offensive war. [illegible] to all classes of property—[illegible] and mere debts. And it [illegible] the mere declaration of [illegible] fiscation; no special act or proc[illegible] The opinion of the best authori[illegible] sentiment of modern times, tend[illegible] right or at least against its exer[illegible] the protection of the individual p[illegible] mies; and it is probable that the war without a special act decl[illegible] now in no case be held to [illegible] modern opinion grows out of the [illegible] the day to mitigate the evils of war. [illegible] that, as the citizens of the hostile [illegible] and without objection into the c[illegible] purpose, there was an implied perm[illegible] that they should, in case war arise[illegible] sonable time in which to remove t[illegible] property from the country. This [illegible] emplified in the fact that treaties ver[illegible] tain provisions securing mutually [illegible] persons of the respective nations [illegible] other nation at the breaking out of war. [illegible] feeling, however, the practice of [illegible] always in accordance therewith. [illegible] as the war of 1812, the right of C[illegible] acts of confiscation was expressly re[illegible] Supreme Court of the United Sta[illegible] also held that, as no [illegible]f Co[illegible] clared enemies' goo[illegible] which had in that [illegible] act of the United St[illegible] At the breaking out [illegible] States generals were i[illegible] the enemy's private pro[illegible] fair rates; and during [illegible] much respect was shown to pri[illegible] customs duties were levied for [illegible] States in ports occupied by our [illegible] make levies upon the duly co[illegible] sums to be used for the main[illegible] army seems to be generally rec[illegible] conqueror. During the c[illegible] of confiscation were [illegible] of the Confederate Congr[illegible] Supreme Court of the United[illegible] and that therefore the title of [illegible] diverted thereby. Such acts c[illegible] well as personal property; in [illegible] debtor paid his debt to the [illegible]

acquittance which, it was enacted, should be a full and complete defence to any suit for the debt. Acts of confiscation were also passed in the North during the late war by Congress; and cotton was constantly seized and appropriated to the use of the United States; both these proceedings have been held by the Supreme Court of the United States to be a valid exercise of the powers of the Federal government. It seems to be the case that, despite the eloquent arguments against confiscation during times of peace, most nations, during the heat and passion of war, forget their peace-utterances and employ confiscation as one means of aiding themselves and injuring the enemy; and in our Mexican war at least it may be observed that the right of private property was less regarded as the war went on and its needs and the passions engendered by it increased. Privateering and the general liability of private property at sea to capture are subjects of a nature akin to what precedes, but not to be fully gone into here: it may be stated, however, that the exemption of such property from capture is further from recognition than is that of private property on land.

(W. M. M.)

CONFLICT OF LAWS. See INTERNATIONAL LAW, PRIVATE.

CONGREGATIONALISM. American Congregationalism is in part exotic and in part indigenous. The Leyden-Plymouth Church brought it hither from John Robinson, who had, under God, received it mainly from Robert Browne through the modifying hands of Henry Barrowe. Browne interpreted the Scriptures as teaching, and implying, a polity in which, as vicegerents of Christ, believers govern themselves in, and as, the local church. This, although theoretically a Christocracy, became practically a democracy. Alarmed, as it would seem, by the anarchic tendencies which the theory developed in poor Browne's slowly and ill-cultured company, Barrowe conceived that a wiser development of the same polity would be that the general membership elect the eldership "of wisdome and iudgement endued with the Spirit of God," and then submit to its governance. But this Presbyterianized their Congregationalism to that degree that it was neither the aristocratic former nor the democratic latter—while less the latter than the former. Robinson reduced this incongruity to its minimum by having but a single ruling officer, with a correspondent exaltation of the practical efficiency of the entire body in the control of its own affairs; so that the Mayflower Church, in point of fact, governed itself under the wise advice of its elder.

See VOL. VI. p. 228 Am. ed. (p. 268 Edin. ed.).

The Salem colonists nine years later came over as Nonconformists, not intending to become Separatists. Yet when this wilderness was reached and practical questions pressed, and the impulse of English feeling had grown weaker by three thousand miles of distance, they saw no open way of carrying on their affairs of religion which promised so well as to adopt the Mayflower system; and so they covenanted together into an Independent Church, which they made Congregational by taking the right hand of fellowship from Governor Bradford and the other Plymouth delegates. When, in the next year, Winthrop and his company were leaving Fatherland, they took pains to bid farewell to the Church of England as their "deare mother," and to beg her faithful remembrance as "a Church springing out of her owne bowels." Yet a like stress of combined opportunity and necessity to that which had swayed Endicott's company, soon drifted them into the same current, until Richard Mather and John Cotton, Thomas Hooker and John Davenport, reasoned out in all its minute particulars—which John Robinson had not been spared to do—the New England way; as a name for which, distinguishing it on the one side from the violent and divisive Separatists, and on the other from the National Church plan, Mr. Cotton found "none fitter" than to call it "Congregationall." Barrowe's dread of democracy—which was, in fact, a dread of the age—with that Presbyterian ruling eldership which had grown out of it, remained, however, upon the system still, and the elders loved to have it so. Nor was it until the days of John Wise, and subsequently of Nathaniel Emmons—when the spirit of the Revolution infused the American air—that the aristocratic element, which for more than a hundred years had weakened and confused the New England Congregationalism, was eliminated, and the system settled squarely down upon the solid and self-consistent basis of that democratic principle which recognizes not only every Church as, under Christ, the peer of every other, and supreme over its own affairs, but every covenanted believer as, with his fellows, the equal sharer of all rights and the equal bearer of all burdens, led by officers chosen from and ordained by themselves.

The American Congregationalism of the present century, the outgrowth of this past, recognizes the right and duty of believers in any locality, who may both wisely and conveniently meet, worship, and work together, to incorporate themselves on confession of faith, and by mutual covenant, as a church; which is made Congregational by the advising, consenting, and recognizing action of the Congregational churches of the neighborhood, publicly admitting it to their fraternity. Each is officered by a pastor and deacons, having also a general committee to aid in laying out and making efficient its work. Each maintains Sabbath and other religious services; through Sunday-school and suitable social evangelistic endeavors, labors to its best ability for the religious awakening and instruction of the entire community in which it is organized; and by the hands of the American Home Missionary Society, the American Missionary Association, the American Board of Commissioners for Foreign Missions, and kindred agencies, seeks at the same time to do its utmost toward the education and Christianization of our own land and the conversion of the world.

As already suggested, American Congregationalism is distinguished from Independency by adding to the principle of the self-completeness, under the Great Head, of the local church, the compensating principle that since all local churches belong to the one family of the Lord, they necessarily owe each other sisterly love and service. The exercise of this takes the name of the communion of the churches. It is commonly manifested through reciprocal recognition, the exchange of members, and the union of labors. Extraordinarily, it has three functions—viz. (1) welcome, on due warrant, of a new church to the fraternity; (2) advice to a sister church asking for it when in need of light or peace, or both; and (3) if a sister church have been overtaken in a fault, the endeavor to restore it in the spirit of meekness, or, if that effort fail, the final withdrawal of the extended fellowship. And inasmuch as neighbor churches can neither conveniently nor wisely discharge these duties of extraordinary fellowship collectively, some of their officers and members are delegated for that purpose, which delegated assemblies are called ecclesiastical councils. It is the belief of American Congregatio-

alists that scriptural warrant is found for such procedure in that action of the early churches which is recorded in Acts xv. 1–31, as well as in the less direct witness of other passages. The results of such councils, while to be received with an antecedent probability that they will convey the will of God upon the point at issue, have yet neither more nor other than a purely spiritual force; the judgment of the wise and devout Amesius being universally accepted as voicing the truth: *ita ut tantum valeat decretum concilii, quantum valet ejus ratio.* If a church have cut off a member, as he feels unjustly, and he ask mutual submission to the advice of a council, and be unreasonably refused, he acquires the right to call one for himself, on whose advice sister churches may orderly restore him to their fellowship. Such is called an *ex-parte* council. Councils are unknown to English Congregationalism. But American Congregationalists regard them as of great value in conserving and making practical and efficient ecclesiastical brotherhood in the departments above named. And it is not usual among them to regard as normally within Congregational fellowship any church or any pastor not formally welcomed thereto by council. Nor do they hold that an ex-pastor is in a condition properly to become a candidate for another pastorate unless he have been dismissed from his previous relation by the advice of a council of neighbor churches, and with its favorable testimony to his good character and his doctrinal and other fitness for continued labor.

It is usual for the Congregational ministers of counties, or equivalent divisions of territory, to meet together from two to four times a year in what are called associations, which are purely ministerial clubs for personal and professional intercourse and culture, yet which, in two respects, have acquired a semi-official relation before the churches. It is common for the candidate for the ministry to offer himself to the examination of some such association for the judgment of its members, as experts, upon his literary, doctrinal, and spiritual qualifications, and only on their favorable certificate to be welcomed to vacant pulpits. On the other hand, the custom extensively prevails of considering as authentically in good standing in the Congregational ministry only such ministers as maintain unblemished membership in some one of these associations, and are so reported in their annual returns. These several district associations are affiliated in State general bodies meeting once a year.

As pastors are thus in neighborly union through associations, so their churches are joined together in district conferences, usually assembling, by pastors and as many delegates as may be convenient, twice a year for purposes of acquaintance, discussion, counsel, prayer, and praise. These district bodies are also aggregated by delegation in one annual State conference, unless included by joint constitution in the annual gathering of the associations just referred to.

It is a fundamental principle of all these delegated bodies that there shall be no attempt at interference on their part in the way of control of the local churches; each one of which, while open to advice, and liable, on cause, to disfellowship, is yet, under Christ, supreme over its own affairs.

The Congregational churches of the United States have been, since 1871, united in a NATIONAL COUNCIL, which assembles once in three years. It is made up by delegation directly from the local churches of the whole land—on the basis of one delegate from every ten churches, and one additional for every fraction of ten over one half; with one delegate also from each State conference, and one for each 10,000 communicants represented in that body, and one for a major fraction thereof; it being intended that such delegates be chosen in equal proportion from ministers and laymen. Its meetings have been held in various cities of the United States, that of 1889 being at Worcester, Mass., where Pres. Cyrus Northrop presided.

The founders of New England Congregationalism were Calvinists, and the churches in 1648, and again in 1680, when by delegation assembled at Cambridge, adopted the Westminster Confession (as slightly modified by the Savoy Synod) as "very Holy, Orthodox, and Judicious." This vote remained unmodified until the Boston council of 1865, in which 2723 Congregational churches in 25 States and Territories, embracing 263,296 members and speaking by the voice of 516 delegates, by unanimous vote substantially reaffirmed it. When, six years after (1871), the National Council was formed at Oberlin, its fundamental constitution included the following d[octr]inal [state]ment—viz.:

"They [the [congrega]tional churc[hes] of States, by elders [and] [dele]gates belief that the Holy S[cripture] only infallible rule of [faith] interpretation thereof [being] with the great doctrines of [the Gospel] monly called evangelical, held in our c[hurches] early times, and sufficiently set forth by [the] Councils." Construed by its c[ontext] this pledges American [Congrega]tionalism ingly to the old-time Calvi[nistic] by the clause preceding the [word] it [expresses it] fellowship with all evan[gelical] believ[ers] that date the general [declina]tion evangelical Arminians may [be] isterial standing in the body, alw[ays] *sentials* of the ancient Orthodox [faith]. The Congregational churches have [maintained] doctrinal position without debate and in Not all of the children of the first sett[lers] immigrants who with them constituted [the] glish generation on these shores, b[ut] bers. By consequence, by the st[rictness] children could not be baptized. And [it] that many who were to compose the were growing up without the seal of [the] so outside of what Cotton Mather [called] "[Eccles]astical Inspection which is to acc[ompany] which was the greater grief to [the] spiri cause the origin and object of the [Church] so largely religious. Special pains [were] to suade these delinquents toward church but, while sober in conversation and corre[ct] they mostly failed to "come up to that e[xperimental] Account of their own Regeneration, which ficiently embolden their Access to the o[rdinance]. This—not without strong opposition—[was] vice of a great council in 1662, in the ex[pedient] Halfway Covenant, by which well-i[nstructed] not scandalous in life, were [admitted] membership—enough to [baptize] children, but not enough [to] take of the Lord's Supper. It [was] that, aided by all the various [causes] new settlements, and the constan[t] novel ideas on all subjects, this ar[ticle] pleted, and greatly damaged the a condition of religious coldness [and]

from which had much to do with the "Great Awakening" of 1734–42, in which Whitefield bore so conspicuous a part. Soon after this latter date, partly in consequence of repugnances toward the old doctrines awakened in these heats of religious discussion, and partly through exotic influence, the germs of the Unitarian controversy began to develop themselves. The political excitements of the Revolution postponed the outbreak, but soon after the beginning of the present century a conflict of opinion arose which resulted in the separation of a portion of the Congregational churches, who had come to reject the doctrine of the divinity of Christ, from those of the sisterhood who retained that faith. When this began there were 361 Congregational churches in Massachusetts. As its result, 96 became Unitarian, with 30 parishes whose affiliated churches did not follow them, leaving 265. So great, however, was the growth stimulated by this controversy that when it was fairly ended—leaving out such as had become merged or extinct—there were found to be 544 Congregational churches in Massachusetts, of which 135 were Unitarian and 409 Trinitarian. Among the former were numbered the first churches of Plymouth, Salem, Boston, and some other of the ancient towns.

Since that date differences of opinion in the Congregational body have mainly respected the philosophy of explanation of the accepted doctrines of faith, seeking their most rational form and defence. Edwards, Hopkins, Bellamy, Emmons, and Taylor endeavored, in turn, some better than previous adjustment of the theories of divine and human efficiency, with cognate inferences. Later, Dr. Bushnell undertook a restatement of the Atonement, which, without repudiating the ancient propitiatory view, laid special emphasis upon the value of its moral influence over men. Later still, differences of judgment have arisen as to the subject of eschatology.

Should a Congregational church fall into denial of the evangelical faith and lapse into Unitarianism, Universalism, Agnosticism, or kindred error, or wilfully tolerate and uphold notorious scandals, any sister church aggrieved thereby may, in a Christian spirit, admonish that church and labor for its restoration. Should this prove without effect, the admonishing church may orderly assemble a council to advise concerning the acts and administrations of the offending body. Finding ground for so doing, this council may fitly admonish the same. This proving ineffectual, such council may advise the Congregational fellowship of churches to withdraw from the erring sister all acts of communion until reformation shall appear. Affirmative response to this advice puts the offending body out of the fellowship of all churches so acting, and, by inference, of all silent churches; and so—by reversal of the process by which it was first received to the denomination—the lapsed company ceases to be a Congregational church. In the case of gross heresy or evil life in a Congregational minister, the church to which he belongs may begin to deal with him for the same as if he were merely a private member until it reaches full conviction of his guilt. Then, in virtue of the involved fellowship of the churches which helped to make him a minister, instead of proceeding to the final issue, it should call a council and submit the whole case to its advice—should he decline to join in a mutual council for the purpose, calling one *ex-parte*. If satisfied that there is need for such procedure, this council may advise the church to proceed to deposition and excommunication, and may publicly withdraw that fellowship of the churches by which he was admitted to the Congregational ministry. If the church to which such an offender belong cannot or will not take the action here named, *any* Congregational church may take it; scrupulous regard being had to equity of procedure.

Before A. D. 1800, American Congregationalism had scarcely extended out of New England; Congregationalists emigrating to newer portions of the country, with a willingness more exhibiting their catholicity than their intelligent fealty to the faith of their fathers, almost uniformly became Presbyterians. This took place to such extent that in the Albany Convention of 1852 it was estimated that there were then in the Middle States and at the West at least 2000 Presbyterian churches which should naturally have been Congregational. Besides this, the anti-slavery sentiments held by great numbers of Congregationalists, and avowed by many of their public bodies, for a long time seriously interfered with the progress of the denomination at the South. Since the war of the Rebellion all this is changed, and the polity has extended itself rapidly over territory where it had been before unknown. Congregationalism now has, outside of its original New England home, an average of more than 95 churches in every State and Territory of the nation; which, since it is only twenty-four years since it crossed the line between the old free and slave States, is a rapid growth.

The *Year-Book* for 1890 contains the returns from 4689 churches, comprising 491,985 members. These are most numerous in the New England States, which have one-half the total membership, yet they are largely developed in the Middle and Western States, and are growing in the Southern and Pacific States, and in the Territories. The number of ministers engaged in pastoral work was 3065; without charge, 1575. The Sunday-School membership had reached 610,277. The annual home expenditure was $6,046,962, and that for foreign missions, $357,929. The benevolent contributions to churches throughout the year reached the sum of $2,398,037; to Sunday-Schools, $145,307.

The Congregationalists of the United States perform their various missionary work, not, like most of their sister denominations of Christians, through ecclesiastical organizations, but by voluntary associations. There are eight such associations through which—while freely giving also through more general channels—they especially labor. These are as follows—viz.: (1) *The American Board of Commissioners for Foreign Missions*, founded in 1810. This now works 17 missions, having 814 stations, including 1717 laborers, of whom 414 are from this country. It has developed and now has care of 272 native churches—not including those of the Hawaiian Islands, which have graduated from its oversight—with 18,446 members. It manages also 51 institutions of a high grade in which are 1468 young men, and 36 in which are more than 1400 young women, besides 791 common schools in which are more than 30,000 pupils. Its total receipts for 1881 were $691,245.16; its expenditures, $693,304.45. A *Woman's Board of Missions* working in connection with this society has also 89 missionaries and 67 Bible-readers, and supports 28 boarding and high schools and five homes for higher education, all including over 1000 pupils, with 114 common schools attended by near 3000 children. Its receipts for 1881 were $119,958.56. (2) *The American College and Education Society*, founded in 1816. This aids in the establishment of Christian colleges and in the education of young men for the ministry. It is now engaged in aiding in the founding of

ten colleges, and is assisting in the support of 269 young men. Its receipts for 1881 were $256,168.53. (3) *The American Home Missionary Society*, organized in 1826, intended to assist in the evangelization of our own country. During 1881 it helped to sustain 1032 missionaries, who preached regularly in 2653 stations, and organized 131 churches. Its receipts were $290,953.72 in cash, and in supplies $57,988—a total of $348,942. A *Woman's Home Missionary Association* is also connected with this, whose receipts for 1881 were $6402.15. (4) *The Congregational Publishing Society*, founded in 1832 for the work which its name suggests. Its total sales for 1881 were $84,196.65, and its receipts from churches, etc., $2657.68. (5) *The American Missionary Association*, established in 1846. It labors chiefly among the freedmen of the South and the Indians. It has under its care 82 churches, 54 institutions of education, 369 missionaries and teachers, 9108 students (of whom 104 are in theology, 20 in law, and 91 in a regular college course), while near 150,000 pupils are under the instruction of teachers which it has graduated, and 13,000 Indians are now under its care. Its receipts for 1881 were $243,795.23. (6) *The American Congregational Union*, which was founded in 1853, and especially endeavors to aid needy Congregational churches in erecting houses of worship. Its receipts for 1881 were $55,357.35, with which it gave assistance to 65 churches. (7) *The American Congregational Association*, also founded in 1853, largely to conserve and perpetuate the Congregational literature. It owns a fireproof building at the corner of Beacon and Somerset streets, Boston, and has a library of nearly 30,000 books and over 125,000 pamphlets. (8) *The New West Education Commission*, founded in 1879 to stimulate education on the frontier. It received about $25,000 in 1881, and has under its charge 5 incorporated academies and 11 other schools, 31 teachers and more than 1000 pupils. There are seven theological seminaries which have been established and are sustained especially for the training of American Congregational ministers. These are: (1) *Andover*, Mass. (1808), having last year 6 professors, 9 lecturers, and 61 students; (2) *Bangor*, Me. (1816), having 4 professors, 1 lecturer, and 28 students; (3) *Theological Department of Yale College*, New Haven, Conn. (1822), having 5 professors, 7 lecturers, and 97 students; (4) *Hartford* (formerly East Windsor, Conn.) (1834), having 6 professors, 2 lecturers, and 30 students; (5) *Theological Department of Oberlin College*, O. (1835), having 4 professors, 1 lecturer, and 41 students; *Chicago*, Ill. (1858), having 5 professors, 2 lecturers, and 43 students; and the *Pacific*, at Oakland, Cal. (1869), which has 2 professors, 5 lecturers, and 9 students. These give a total, for the seven institutions, of 32 professors, 27 lecturers, and 309 students. (H. M. D.)

CONGO REGION. The basin of the Congo is second only to that of the Nile, among the rivers of Africa, and the courses of a great number of the affluents are as yet unexplored. Roughly, it may be said to extend from the basin of Lake Tchad upon the north almost to the Kalahara desert on the south, and to comprise almost the whole of equatorial Africa between the Nile and Zambezi basins and the Atlantic, excepting the comparatively small areas drained by such coast rivers as the Ogowé, Kuilu, etc. This vast area, actually unknown to Europeans till the journeys of Livingstone, Cameron, Stanley, and De Brazza, during the last few years, is inhabited by many millions of natives, and appears to offer considerable inducement to European colonization, as well as an outlet for European manufactures. The greater portion of this region is as yet unexplored, but from what is known it is evident that much of it is of unexampled fertility. The equatorial forest region descends the main river as far south as the head of Stanley Pool, and the more mountainous district which intervenes between that point and the low strip of coast contains valleys rich in both animal and vegetable life.

Dapper's Map (1676) shows the Zaire or Congo as arising in an immense lake, extending from 5° to 12° N. lat., and from 46° to 49° 30′ E. long.

The maps of Livingstone, Speke, and Grant, and others published before 1863, show Lake Tanganyika as separate from the Congo, which is, however, represented as a comparatively insignificant stream. The existence of that great northern curve which takes the main stream parallel with Lake Tanganyika till the equator is crossed, thence westward to about 2° N. lat. and 20° E. long., and thence southwestward to its mouth about 6° S. of the equator, was not suspected when these earlier maps were made, and even Cameron's map (1875) shows the Congo as passing almost directly across the continent from the point where that traveller reached its upper course, to its mouth.

It was Livingstone who first found the [illegible] laba. mately identified with the Congo, while 1876, as forcibly narrated by himself in volume of *The Dark Continent*, was the man to embark upon the Lualaba [illegible] the dangers of the flood, and t [illegible] from hostile savages who [illegible] even the right to camp within thei[illegible] y, pursue his course until he reached the c

Like the Nile, and, indeed, like many [illegible] Al rivers, the Congo has its origin in a and it is to the affluents of these lakes [illegible] look for the longest course of the C

One of the principal of these lake[illegible] Chambeze, which must not be [illegible] Zambezi. The Chambeze rises [illegible] N. 10° S. lat. and 31° 40′ E. long.. [illegible] runs [illegible] ward to Lake Bangweolo, or [illegible] water 3688 feet above the sea, [illegible] west more than two degrees. [illegible] in width. From the northv [illegible] lake the Lualaba flows nort[illegible] smaller body of water, the ce [illegible] of [illegible] by the parallel of 9° S. lat. [illegible] this of this lake the great Lualaba [illegible] C [illegible] ward, with a considerable in [illegible]

Not far to the eastward of [illegible] ably elongated narrow lake of [illegible] a deep depression or [illegible]. This [illegible] 330 miles long, with [illegible] line [illegible] 900 yet unfathomed. Its s[illegible] are the [illegible] Livingstone's later wan[illegible]. Its [illegible] Lualaba suggested that pro[illegible] lv its ove that river, but the attemp[illegible] both [illegible] Stanley to find such an ou[illegible] were fut[illegible] these explorers discovered [illegible] or kuga, which seemed to have [illegible] which appeared to be so closely [illegible] courses flowing westward that [illegible] to the effect that "the ancient [illegible] sume its old duties of conveying the [illegible] the Tanganyika down into the [illegible] stone, and thence along its [illegible] the Atlantic." The lake, [illegible] and observation, had been ste[illegible]

time of Stanley's visit in 1876 only a few inches of mud banks and a frail barrier of papyrus and reeds interposed a barrier to the exit of the waters of the lake.

Three years after Stanley's visit, on Christmas, 1879, Mr. Joseph Thomson reached the Lukuga, and states that when he viewed the noble stream moving westward on its way to the mighty Lualaba, or Livingstone, as Stanley named it, and thought of Stanley's straws thrown in to try to find a current, he could scarcely believe he was in the same spot.

Whether the overflow of Tanganyika is periodical, or whether, as suggested by Stanley, a comparatively recent cataclysm united the northern end of the long depression to the southern, draining off its waters and thus for a long period reducing its level, it is impossible to say. At any rate the Lukuga is its natural outlet. It has since been ascertained that the level of the lake has been slightly reduced and the current of the Lukuga slackened. The Stanley Falls, seven successive cataracts, are ranged along the Livingstone from about 30′ S. of the equator to 15′ N. of it. The five upper ones occupy a length of about 15 miles as the crow flies, while the sixth stands some 30 miles lower down, and the seventh about 35 miles distant from the sixth. These cataracts, like those of the lower Congo, do not seem to be anything more than small descents, but between them the waters boil in a succession of rapids, and Stanley was compelled to leave the river. At the last cataract the river is about 1300 yards broad from bank to bank, but its course is divided by an islet 760 yards across, so that the broad stream is at the fall compressed to half its previous width, and rushes over with resistless force. The fall is only ten feet deep. The southern tributaries of the Congo, themselves mighty rivers, have been partly explored, and must prove of great service in the future development of the region.

Nearest to the Lualaba is the Luafuba or Kamorondo, whose headwaters, the Lufira, Lunfupa, and Luburi, rise near 12° S. lat. The Luafuba is indicated upon Stanley's map as entering the Lualaba a little south of the Lukuga from Lake Tanganyika. The great Lake Kassali, 1750 feet above the sea, lies on the course of the Luafuba.

Westward lies the great Kasai River, which with its tributaries forms the most important affluent of the Congo, into which it flows at a short distance above Stanley Pool. It has numerous large branches, of which the Sankulla, with its tributary, the Lomani, constitutes a great river. These flow eastward and approach the parent stream. The Quango, a great western affluent of the Kasai, rises at about 12° S. lat. and flows nearly due north.

Of the northern affluents of the Congo, the most important is the Mobangi, which is navigable for hundreds of miles, and of which the great Welle River is undoubtedly a continuation, though their direct connection has not yet been traced.

Second in importance of the northern tributaries is Aruwimi, the stream which was followed by Stanley in his recent journey and which he traced to the immediate vicinity of Lake Albert Nyanza. There are many smaller, yet important streams, navigable through a considerable part of their course, and the great interior basin of the Congo is capable of being very widely opened up by steamboat navigation. West of the Congo, above Stanley Pool, lies Lake Leopold II., a large body of water, which connects with the Lukenje, and thence with the Kasai. Thirty miles north of this lake is Lake Watumba, draining a highly fertile region and surrounded by a very dense population. The Mobangi joins the parent stream just south of the equator, flowing north, and then, as the Welle, eastward, where it receives a number of large tributaries, the Mbomu, with its branch, the Shinko, and others, these running far north into the Soudan region.

The Lower Course of the Congo.—The Congo empties into the ocean by a single mouth, a fact which suggests that the outlet is comparatively new—that the river has not yet had time sufficient to form a delta like those of the Nile, Niger, and Zambezi. Some blind creeks have increased in length within the memory of European settlers on the Lower Congo, and some believe that eventually the river will force a way to the sea at Kabinda.

Near its mouth the Congo widens into a sort of lagoon where ships of the largest size can anchor within fifty yards of the shore. Between this and the sea stretches a strip of lowland through which the river has broken, and here, on Banana Point, are the European factories, of which the Dutch is the largest. The lower course, to a little above Boma or Embomma, which, previous to the advent of Stanley, was the highest point colonized by Europeans, is swampy and unhealthy, but from Boma to Stanley Pool the river passes through a mountain region, and its course is broken by numerous rapids and falls of small elevation, rendering navigation difficult. In this mountain region the hills are devoid of forest, probably largely in consequence of the bush-fires which sweep over wide areas whenever there is a dry season. The valleys, however, both of the Congo and its tributaries, are filled with fine forest and abound in animal life.

The first settlement of the International Association is Vivi, 115 miles from the sea; 52 miles farther up is Isangila, and 80 miles beyond is Manyanga. A road has been constructed from Vivi to Isanghila, at which point water communication is continued to Manyanga. Between Manyanga and Leopoldville, the chief centre of the International Association, the course of the river is again obstructed by falls, but there is a road on each side, and at the village of Lutété, on the southern bank, the route to Leopoldville follows the old ivory route which, passing from the interior by Lutété, went thence to San Salvador, and terminated on the coast at Ambrizete. The lowest fall of the Lower Congo is a little above Vivi, while the highest are the Ntombo Mataka Falls, and the Father, Mother and Child near Leopoldville. This settlement is about 2 miles below Stanley Pool, which is a fine sheet of water 25 miles long by 16 wide, but is encumbered by many large islands, the largest 13 miles long. At the entrance of the pool is the low cliff called Calina Point, the fortification of which would close the Lower Congo effectively, and opposite to this point is the as yet purely native village of Mfwa or Brazzaville.

At the Pool the mountain region is left behind, and the river is navigable as far as the Stanley Falls, at the western extremity of the great bend in the Congo. The Upper Congo enters the Pool through a rather narrow passage, but widens above and appears to be obstructed with many islands. High-wooded hills fringe the western bank of the river. Msuata, one of the prettiest of Mr. Stanley's stations, is 110 miles from the pool, and is surrounded by friendly natives. Still higher up is the junction of the Kwa, the lower portion of the Kasai, which here receives the Quango

of obtaining their independence. That object being attained by the treaty of 1783 with England, the close of the war was followed by a reaction toward absolute State independence. The inability of the Congress to meet the obligations it had incurred, and to maintain even its limited authority, diminished the popular respect for it, and promoted this reaction. The people of each State were quick to discover any local and selfish advantage which might result from their isolated sovereignty. The desire to retrieve themselves from the devastations and losses of war was more potent and more universal than the patriotism which sought to lay the foundations of a powerful and perpetual union. This condition of public sentiment was reflected in the evident timidity with which the patriotic statesmen of that period moved toward a more complete union.

On the 21st of July, 1775, Dr. Franklin had submitted to the assembly of State delegates, called a Congress, a plan entitled "Articles of Confederation and Perpetual Union of the Colonies." Nevertheless, they contained a provision for the possible return of the colonies to a connection with Great Britain. This appears to have been the basis of the plan reported to that Congress from a committee July 12, 1776, which is in the handwriting of Mr. John Dickinson, of Delaware, to which as amended the Congress agreed on Nov. 17, 1777, and which they recommended for adoption to the several States. But the ratification by all the States was not completed till March 1, 1781, near the close of the war, when Maryland was the last of the States to give its consent. These articles formed the compact of confederation, and settled the powers of that Congress which continued, very feebly, the Federal Government until the adoption of the Constitution of 1787.

The previous Congress of the Confederation served in no respect as a model for its successor. It was rather regarded as a beacon to warn patriots from the national perils which it embodied, and in the midst of which the new-born republic was already becoming stifled. That assembly could not properly be styled a legislature, owing to its want of power both over States and the people of the several States. The separate States retained their sovereignty, refused at will their quota of contributions for national debts and national expenses, managed foreign and interstate commerce to suit their local interests, and made partial compacts with neighboring States in a manner which produced a general confusion bordering upon anarchy. The situation of the Confederacy invited the contempt of Europe, and especially of England, which profited by domestic dissensions in America to grasp greater dominion on the seas, and greater control of international commerce. The national finances were in disorder, and no power existed to retrieve public credit. There was no federal judiciary. There was no real legislative power. It was an executive government by convention, without power to execute its decrees. It was a single House composed of delegates from States, each of which expressly retained "its sovereignty, freedom, and independence." Each had the right at any time to recall and replace its delegates; and even their compensation was paid by the States sending them, so that no bond should hold them to the common government. Voting was by States, one vote to each, thirteen in all, and on important questions nine votes were required to the validity of their action.

Behind this powerless body were the separate States, extremely jealous of their local authority, and unwilling to surrender it. Some of them possessed exceptional advantages for foreign commerce, and could tax the consumption of less-favored States. Some profited by the viciousness of a wretched currency. Others were unwilling to submit to national taxation. Others, more patriotic, feared the possible tyranny of a vigorous government in which they had no controlling voice. A common government, with its seat removed to a great distance from most of them, with communication at that time rare and difficult, seemed to them like a foreign power intended to deprive them of the municipal liberties which they had acquired by the recent revolution. The smaller States feared a total sacrifice of their rights and power in presence of the large and populous States. Upon reading the credentials of the deputies from Delaware to the Constitutional Convention, it was observed that they were prohibited from changing the article in the Confederation which established an equality of votes among the States.

The leading statesmen in the convention considered all the models of a free government which history supplied, whether ancient or modern, seeking in all the elements which history approved, and avoiding the weaknesses which had conducted them to ruin. Apart from the peculiar provisions rendered necessary by the municipal conditions then existing, they more nearly followed the securities to liberty established by the British constitution than any other. The Parliament of Great Britain was an institution of their own ancestors. The voice of the people was heard in its halls, and their champions had always been found in one of its branches. The hereditary authority which existed in the other branch, and which tended to the conservation of arbitrary right and privilege, was alien to their ideas of intelligent and progressive civilization. There must be a substitute for this. The conservative force was here specially deposited in an independent judiciary, and in the veto power of an Executive. Instead of the conservatism of an hereditary Senate, they established a body with longer tenure of office than the popular branch, and with a secondary constituency; but renewable by thirds every two years in order that the people, proceeding slowly and with deliberation, might be able also to bring that body into concord with their views. Thus, after a period of four years at latest, the people could bring into harmony with their deliberate purpose the legislative powers of an Executive, of a Senate, and of their House of Representatives.

The jurisdictional powers of Congress may be divided into two classes: the powers specially defined; and the powers embraced by general definition.

In the first class are the following: "To lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defence and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States; to borrow money on the credit of the United States; to regulate commerce with foreign nations, and among the several States, and with the Indian tribes; to establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States; to coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures. To provide for the punishment of counterfeiting the securities and current coin of the United States; to establish post-offices and post-roads; to promote the progress of science and useful arts, by

most valuable product, but, to prevent the annihilation of the elephant, the hunting of this animal is now prohibited except by special permission. At an ivory market opened at Antwerp, July 30, 1889, 1139 tusks of Congo ivory, weighing 15,000 kilogrammes, were sold. Among recent events, the finding of copper and iron has been reported. The advance so far made by the Congo Free State has been exceptionally rapid, and the peaceful character and trading habits of its inhabitants promise to bring it quickly into marked commercial and political importance.

Native Races.—The natives of the Congo basin appear to be, both physically and intellectually, as a whole, much superior to those which dwell to the south of them, and appear to belong principally, if not exclusively, to the great Bantu family. The possible exceptions are certain dwarf races, and the coast tribes, which latter are either degraded by the climate, or mingled with an earlier negro population. There are two types on the coast about Loango: the Bantu, with small hands, well-shaped feet, high, thin nose, beard, moustache, and plentiful hair; and an inferior type with splay feet, high calves, thick lips, hairless face, and crisp hair. This mixed people, the Ka-kongo, are found in the Portuguese colonies along the coast as far south as Mossamedes, for they are the servants, sailors, and laborers of the region. The great Ba-kongo tribe was once the ruling race of the Lower Congo; its kingdom was the kingdom of Congo of Portuguese annals, and its king still lingers at Sao Salvador. Many Portuguese words have found their way into the language. The Ba-shi-kongo, a degraded branch of this tribe, inhabit the southern bank of the Congo near its mouth. Higher up the river are the Ba-sundi and Ba-bwende, who seem less disposed than some of the other tribes to treat with Europeans. At Stanley Pool the Ba-teke are the chief tribe. They appear to have only recently come down to the Congo from the region between that river and the Ogowé, where they were met with by De Brazza. They scar their cheeks with lines, and often wear their abundant hair drawn tightly over a pad into a kind of chignon. Their headquarters may be said to be at the town of Mpumo Ntaba, the successor of De Brazza's Makoko. Intercalating with the Ba-teke, yet on the whole located higher up the river, are the Ba-yansi. This people, from Mr. Johnson's account, appear to be the most intelligent upon the river. He says of them: "The Ba-yansi, of Bólóbó, have a decided indigenous civilization. Their houses are large, and fairly high, and divided into three or more rooms; the floor is often covered with clean matting, and the door, made of laths and matting, can be swung backwards and forwards on a rude hinge. Their pottery, their weaving, their wonderful power of artistic decoration, their metal-work in iron and copper, their husbandry and their contrivances for fishing and bird-trapping all show a great advance on the tribes of the lower river."

The Wabuma, on the river of that name, are a gentle and inoffensive race, less intelligent than the Ba-teke and Ba-yansi. They are the great carriers of the Congo, and traffic regularly between the Bangala of the equator and the people of Stanley Pool, who pass the ivory, etc., onward to the coast. The Ba-yansi are described as perfect Greek statues in the elopment and poise of their forms, and are of a chocolate tint. All the natives are very fond of and draw harmonies of plaintive tone and rhythm from their five-stringed instruments.

Climate.—The lowest reach of the Congo is somewhat unhealthy, but much less so than the Gold Coast or the Niger. Dysentery is almost unknown above Vivi, on account of the good drinking water from the numberless rills that run alike in dry and wet season. The most prevalent form of sickness is the African fever from over-exposure and sudden chills; but the most dangerous is bilious fever, usually the result of imprudence. At Msuata the temperature ranges from 60° at two in the morning to 87° in the shade at noon; this in the rainy or hot season. If a helmet is worn on the head, or an umbrella carried, it is possible to walk about all through the day. At the mouth of the Congo November, December, February, and March are the wet months, with a short dry season in January, but on Stanley Pool, January is wet, and there are only four dry months.

Natural History.—The plants and animals of the Congo basin are those of Western Africa generally. Monkeys seem scarce on the Lower Congo, though several species occur. The gorilla or the chimpanzee, or both, are found on the Upper Congo, and lemuroids are common. The lion is absent from the lower river, but the leopard is everywhere abundant. Genets are kept as pets. The manatee and a river dolphin occur below the falls. The elephant and the hippopotamus are common, as is the wart-hog or river-hog, but the rhinoceros is absent. There are few antelopes on the Lower Congo. Swimming and wading birds abound, especially at Stanley Pool. The only vulture of the lower river is *Gypohierax*, the Angola vulture, a most expert fisher. The curious *bat*-eating hawk (*Machærhamphus Anderssoni*) has been shot at Vivi. The gray parrot is everywhere abundant. Snakes seem to be rare below Bólóbó, but lizards, especially large monitors, abound. The common crocodile is the great danger of the rivers. Little is known of the fishes, but Polypterus is common, as well as several siluroids. Insects, some beautiful, some troublesome, abound. Cockroaches, red ants, and flies are most annoying, and the jigger or burrowing flea has found its way across from America.

Palms and leguminous plants and trees are conspicuous features in the landscape; and among the floral beauties of the region are the gigantic orchid *Lissochilus*, the paplionaceous *Camoensia*, *Rhyncosia* and *Loncho-carpus*, the *Mussœnda*, and deep blue *Commelynas*.

The domestic animals include the pig and sheep, probably introduced from Asia; the goat; a dog with foxy head and fawn-colored coat, resembling the pariah dog of India; a lean, long-legged, and ugly variety of cat; a small variety of the domestic fowl; and the Muscovy duck, introduced by the Portuguese. The dog never barks, though he howls upon occasion. It is considered very dainty eating, and by unwritten law is reserved for the sex which, lacking gallantry, asserts itself to be the superior. The natives owe most of their fruits and vegetables to the Portuguese, who introduced manioc, sweet potatoes, corn, pine-apples, ground-nuts, sugar-cane, oranges, and limes.

(W. N. L.)

CONGRESS OF THE UNITED STATES. An elective Legislature, composed of two Houses, to which are intrusted all legislative powers granted by the Constitution of the United States of America. (See CONSTITUTION OF THE UNITED STATES.)

The loose compact, or league, of the thirteen colonies, known as the Articles of Confederation, and administered by the original Congress, had proved barely sufficient to unite the States for the common purpose

of obtaining their independence. That object being attained by the treaty of 1783 with England, the close of the war was followed by a reaction toward absolute State independence. The inability of the Congress to meet the obligations it had incurred, and to maintain even its limited authority, diminished the popular respect for it, and promoted this reaction. The people of each State were quick to discover any local and selfish advantage which might result from their isolated sovereignty. The desire to retrieve themselves from the devastations and losses of war was more potent and more universal than the patriotism which sought to lay the foundations of a powerful and perpetual union. This condition of public sentiment was reflected in the evident timidity with which the patriotic statesmen of that period moved toward a more complete union.

On the 21st of July, 1775, Dr. Franklin had submitted to the assembly of State delegates, called a Congress, a plan entitled "Articles of Confederation and Perpetual Union of the Colonies." Nevertheless, they contained a provision for the possible return of the colonies to a connection with Great Britain. This appears to have been the basis of the plan reported to that Congress from a committee July 12, 1776, which is in the handwriting of Mr. John Dickinson, of Delaware, to which as amended the Congress agreed on Nov. 17, 1777, and which they recommended for adoption to the several States. But the ratification by all the States was not completed till March 1, 1781, near the close of the war, when Maryland was the last of the States to give its consent. These articles formed the compact of confederation, and settled the powers of that Congress which continued, very feebly, the Federal Government until the adoption of the Constitution of 1787.

The previous Congress of the Confederation served in no respect as a model for its successor. It was rather regarded as a beacon to warn patriots from the national perils which it embodied, and in the midst of which the new-born republic was already becoming stifled. That assembly could not properly be styled a legislature, owing to its want of power both over States and the people of the several States. The separate States retained their sovereignty, refused at will their quota of contributions for national debts and national expenses, managed foreign and interstate commerce to suit their local interests, and made partial compacts with neighboring States in a manner which produced a general confusion bordering upon anarchy. The situation of the Confederacy invited the contempt of Europe, and especially of England, which profited by domestic dissensions in America to grasp greater dominion on the seas, and greater control of international commerce. The national finances were in disorder, and no power existed to retrieve public credit. There was no federal judiciary. There was no real legislative power. It was an executive government by convention, without power to execute its decrees. It was a single House composed of delegates from States, each of which expressly retained "its sovereignty, freedom, and independence." Each had the right at any time to recall and replace its delegates; and even their compensation was paid by the States sending them, so that no bond should hold them to the common government. Voting was by States, one vote to each, thirteen in all, and on important questions nine votes were required to the validity of their action.

Behind this powerless body were the separate States, extremely jealous of their local authority, and unwilling to surrender it. Some of them possessed exceptional advantages for foreign commerce, and could tax the consumption of less-favored States. Some profited by the viciousness of a wretched currency. Others were unwilling to submit to national taxation. Others, more patriotic, feared the possible tyranny of a vigorous government in which they had no controlling voice. A common government, with its seat removed to a great distance from most of them, with communication at that time rare and difficult, seemed to them like a foreign power intended to deprive them of the municipal liberties which they had acquired by the recent revolution. The smaller States feared a total sacrifice of their rights and power in presence of the large and populous States. Upon reading the credentials of the deputies from Delaware to the Constitutional Convention, it was observed that they were prohibited from changing the article in the Confederation which established an equality of votes among the States.

The leading statesmen in the convention considered all the models of a free government which history supplied, whether ancient or modern, seeking in all the elements which history approved, and avoiding the weaknesses which had conducted them to ruin. Apart from the peculiar provisions rendered necessary by the municipal conditions then existing, they more nearly followed the securities to liberty established by the British constitution than any other. The Parliament of Great Britain was an institution of their own ancestors. The voice of the people was heard in its halls, and their champions had always been found in one of its branches. The hereditary authority which existed in the other branch, and which tended to the conservation of arbitrary right and privilege, was also to their ideas of intelligent and progressive civilization. There must be a substitute for this. The conservative force was here specially deposited in an independent judiciary, and in the veto power of an Executive. Instead of the conservatism of an hereditary Senate, they established a body with longer tenure of office than the popular branch, and with a secondary constituency; but renewable by thirds every two years in order that the people, proceeding slowly and with deliberation, might be able also to bring that body into concord with their views. Thus, after a period of four years at latest, the people could bring into harmony with their deliberate purpose the legislative powers of an Executive, of a Senate, and of their House of Representatives.

The jurisdictional powers of Congress may be divided into two classes: the powers specially defined; and the powers embraced by general definition.

In the first class are the following: "To lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defence and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States; to borrow money on the credit of the United States; to regulate commerce with foreign nations, and among the several States, and with the Indian tribes; to establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States; to coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures. To provide for the punishment of counterfeiting the securities and current of the United States; to establish post-offices and post-ro to promote the progress of science and useful arts, by s—

ing for limited times to authors and inventors the exclusive right to their respective writings and discoveries; to constitute tribunals inferior to the Supreme Court; to define and punish piracies and felonies committed on the high seas and offences against the law of nations; to declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water; to raise and support armies, but no appropriation of money to that use shall be for a longer term than two years; to provide and maintain a navy; to make rules for the government and regulation of the land and naval forces; to provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions; to provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers and the authority of training the militia according to the discipline prescribed by Congress; to exercise exclusive legislation in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular States, and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places purchased by the consent of the Legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dock-yards, and other needful buildings."

In the second class are the following: "To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this constitution in the government of the United States, or in any department or officer thereof."

The powers denied to Congress are also of two corresponding classes. There is specifically denied the power to suspend the privilege of the writ of habeas corpus, unless required by the public safety in cases of rebellion or invasion. "No bill of attainder, or ex post facto law shall be passed. No capitation or other direct tax shall be laid unless in proportion to the census or enumeration hereinbefore directed to be taken. No tax or duty shall be laid on articles exported from any State. No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties in another." . . . "And no title of nobility shall be granted."

By articles of amendment to the Constitution, further prohibitions and limitations upon the power of Congress are imposed as follows: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble and to petition the government for a redress of grievances. A well-regulated militia being necessary to the security of a free State, the right of the people to keep and bear arms shall not be infringed. No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war, but in a manner to be prescribed by law. The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger: nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property without due process of law; nor shall private property be taken for public use without just compensation. In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defence. . . . The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned."

A general denial of unconferred powers is made in the following language: "The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people." . . . "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." . . . "The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State, on account of race, color, or previous condition of servitude."

This review of the powers respectively denied and granted to Congress clearly shows that the creating convention sought to avoid on the one hand the legislative omnipotence of the English Parliament, and on the other the weakness of the superseded House of Confederated Representatives from States retaining their separate sovereignty. Within the range of granted powers the sovereignty of the Union was complete and absolute. An army, navy, courts, and civil officers were provided to enforce the authority of the Union. All other powers were left to the several States, or rested in abeyance with the people themselves—regarded as the only secure repository of ultimate authority. By the provision of certain methods for the expression of their will, involving delay and deliberation, they secured themselves against the perils of a rash and passionate democracy on the one side, and on the other against the haste and wilfulness of a single omnipotent convention.

All the legislative functions granted are vested in a Congress composed of two Houses, each independent of the other, independent of the Executive, and having a different elective constituency. A census is taken once in ten years, upon the returns of which Congress decides upon the number of Representatives who shall thereafter compose the House of Representatives. That number is apportioned to the different States upon the ratio of population. The Representative must be an inhabitant of the State from which he is chosen, must have attained the age of 25 years, and must have been a citizen of the United States for at least seven years. The qualification of voters electing him is the same as that required of voters for the most numerous branch of the State legislature. His term of office is two years. This House is the judge of the returns and qualifications of its members, may punish members for disorderly conduct, and may expel any member by a vote of two-thirds. A majority of the whole number is required to constitute a quorum for business, although in practice business may be done by a less number where the absence of a quorum is not developed by a count. The House of Representatives has the exclusive right to present articles of impeachment against a public officer of the United States, and to originate bills for raising revenue, which bills, however, may be amended by the Senate, as in the case of other bills originating in this House. It chooses its Speaker and other officers, and establishes its own rules of proceeding.

Congress has power to fix the compensation of its members in both branches. The first Congress established the pay of Senators and Representatives at the rate of six dollars a day for their actual attendance, and six dollars for each twenty miles usually travelled in going to and returning from the sessions. It was provided that this sum should be increased from March

4, 1795, to seven dollars. It was subsequently established at eight dollars a day. At a later period the per diem compensation was changed to a salary of $3000 per annum and mileage. With the enlarged wealth and business of the country it was increased, in 1866, to a salary of $5000 per annum, and mileage at the rate of twenty cents per mile, where it now remains.

In distinction from the House, whose members are chosen directly by vote of the people, the Senators are chosen by the State legislatures, which are themselves elected by the people of the several States. Each State, irrespective of its population, is entitled to two members of the Senate. This provision, intended to preserve the relative equality of the States in one branch of Congress, is the only provision of the Constitution which may not be changed in the mode provided for alterations of that instrument. In the popular branch the great States have a vote proportioned to their population, reaching as high in one case as thirty-three in number, while the smallest have only one member. The equality of State votes in the Senate is an anomaly of representation, but was rendered necessary by the original fear of the smaller States that their interests and their influence would be lost in an overwhelming voting power of the larger States. The number composing the Senate is, therefore, and must always be, twice the number of the States in the Union. Congress having power to admit new States into the Union, the admission of each new State involves the addition of two new Senators, and of at least one member of the other branch. The term of Senators is six years, but they are so classified that, as nearly as practicable, one-third of the body is renewed every two years, the expiration of the term being coincident with that of the members of the other House. The constitutional qualifications of a Senator are, that he shall be an inhabitant of the State electing him, shall have reached the age of thirty years, and shall have been for nine years a citizen of the United States. The Senate, like the House, establishes its own rules of procedure, and may punish its members for disorderly conduct, and may by a vote of two-thirds expel a member. Its presiding officer is the Vice-President of the United States, voting only in case of equal divisions; but in his absence, or when he shall exercise the office of President, the Senate chooses from its own body its President *pro tempore*, as it also appoints all other of its officers. It also has the sole power to try all cases of impeachment, acting therein upon special oath. It is so far a part of the executive power that all treaties, and the principal officers appointed by the President, must be confirmed by the Senate. The sessions for this purpose are called executive sessions, and are held with closed doors, and a record is kept in a separate journal, which is not published.

The President, in turn, is so far a part of the legislative power that his approval is necessary to all acts of Congress with two exceptions. Where an act being vetoed by him is, upon reconsideration, repassed by two-thirds of the votes of each House, it becomes a law. Where the act remains in his hands unsigned for ten days, Congress being in session, it shall become a law without his signature.

Congress is required to meet once at least every year, and the day of meeting, until otherwise provided by law, is the first Monday of December. Journals of proceedings must be kept and published by each House. Neither House can, with o
other, adjourn for more t
session of Congress. The
quired upon any question by
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hold any other office under the U
he be appointed to any United
rendered more lucrative by
which he was elected.

The communications between the two Houses are by messages in established form, transmitted by one of their clerks. The attendance of a clerk bearing a message from his House is notified by the doorkeeper, who announces "a message from the Senate" (or from the House of Representatives, as the case may be.) The clerk addresses "Mr. Speaker" or "Mr. President" in the Senate.) The presiding officer recognizes him as "Mr. Secretary" (or "Mr. Clerk," if from the House of Representatives.) The messenger then says, "The Senate (or H. R.) has passed" such a bill or resolution, giving its title, with or without amendment, as the case may be, "in which I am directed to request the concurrence of the House of Representatives" (or Senate). Thereupon he bows to the presiding officer and withdraws; and the House, which has suspended the current proceeding to receive the message without delay, resumes its business, and the message and bills accompanying it go upon the table for future disposition. Each House has its own calendar of the order of business, in which preference is given to its own bills which have been returned with amendment proposed by the other body.

The Senate does not recognize the "previous question," or *clôture*. Debate in that body is unlimited, and certain measures have been, near the close of the session, designedly talked to death. The first response on a roll-call, begun when no senator claims the floor, closes the debate. The hour for closing debate on any question may also be fixed in advance by unanimous consent. Motions to reconsider any vote must be entered before the close of the legislative day next following that on which the vote was taken. The more numerous branch of Congress, however, long ago found it necessary to establish the "previous question" in order to advance their business. A motion for the previous question is not debatable, and can be made after or even before debate on the main question, and can be applied to the bill and to any or all pending amendments—to everything preceding the engrossment and third reading of the bill; and the member in charge of the bill is allowed one hour, after the previous question is seconded, to close the debate. As a majority could second the motion, and so cut off debate on the part of the minority, a practice grew up of causing delay by dilatory motions until the
should concede to their opponents a reaso
for debate in cases where it was dem
provided that when the previous qu
on any proposition not previously debat
shall be thereafter allowed for debate,
equally between the advoca and opponents
measure. There is also a standing rule of the
of Representatives, which pe
during the session, a motion to
pass a bill or resolution upon a sin
this, however, the concurrence of
House is required. A vote so tal
a motion to reconsider.

As the body of Representatives became more numerous, and official reporters gave to the government press all the debates in their full extent, it became evident that a remedy must be provided against excessive consumption of time by ambitious and voluble speakers. In 1841, after efforts in several previous years to the same end, the House adopted the peremptory rule—"no member shall occupy more than one hour in debate on any question." The rule has continued in force to this day. Its propriety is no longer questioned. But in practice the House, in its good nature, gives unanimous consent to orators who interest it to overpass this limit of time. By unanimous consent also, all rules of procedure established by the House may be waived.

All bills for raising revenue, and for appropriating money, must first be considered in committee of the whole House, for which a chairman is designated by the speaker to preside during the consideration of a particular bill in the committee. The House alone, not the committee, can limit or close debate therein. No action of the Committee of the Whole is entered on the journals of the House except that which the chairman reports as adopted by the committee when it finally rises and reports the measure to the House. The bill cannot be reported to the House so long as proposed amendments are pending in committee, which therefore often proves to be the grave of important measures. The yeas and nays cannot be demanded in Committee of the Whole.

The Senate is less burdened by rules than the House. It considers certain measures "as in Committee of the Whole," without a change of presiding officers. Its business is more directly controlled by a majority, taking up a certain bill, laying it aside, considering another, or resuming the first.

No member of the executive government having a seat in either House, all measures of legislation must be initiated in one or the other branch of Congress. A draft of a bill sometimes, but rarely, accompanies an executive communication to one of the Houses. In that case it goes first to a committee charged with the subject. Either House may take the initiative in any legislation, save only bills for raising revenue. The House has claimed, and the Senate disputed, that appropriation bills must also originate in the House. Custom has established it as a rule, while it is disputed as a prerogative of right. To secure careful deliberation of a mass of business so great as that devolved on Congress in the interest of fifty millions of people, each House has classified the subjects of legislation, and distributed their first consideration among 30 standing committees in the Senate, and 42 committees in the House of Representatives, designating also, upon occasion, select committees for particular objects. The members of these standing committees in the Senate are appointed by order of the Senate itself, at the beginning of each Congress, the Senators of each political party consulting and nominating respectively their representative members on each committee. In case of special or select committees it is usual to move that the president be authorized to appoint them. In the organization of the House the speaker possesses an almost despotic authority. He appoints without restraint, except as to number, all standing, select, and special committees, making his own choice from both political parties, and regulating their respective representation on each committee. Custom requires that party representation on committees shall be as nearly as practicable proportioned to their respective numbers in the House; but violations of this usage sometimes occur. The speaker also has the absolute power of recognition of any one among members rising to debate the question, and in this respect has great power to give direction to any discussion. If a member wishes, under suspension of the rules, to bring forward a measure, it is usual for him to notify the speaker, privately, of the particular bill or resolution, and if disapproved by him he will decline to give him recognition. If the speaker distrusts the purpose of the member rising, he will inquire his purpose before recognizing him; and if, being recognized, he makes a surprising motion, the speaker has frequently refused to put the question, saying the member was not recognized for that purpose. Every member has the right to appeal from the decision of the chair to the House, but the latter seldom refuses to sustain the speaker. The resulting effect of the rules and practice of the House is to enable the speaker to exercise a very controlling influence over legislation, and through the chairmanship of committees of chief importance practically to appoint the political leaders of parties. As he is wise or unwise in the exercise of his functions, he directs his party to success or failure.

At the date of this article, fifty-one Congresses of the United States have assembled, performed their functions, and closed their terms of existence. More than a century of this constitutional government has passed into history. It has been tested by the severe struggles of war, foreign as well as domestic, and by the less manifest perils of long periods of peace. It has been tried in adversity and in prosperity, in financial distress, and with a redundant revenue. Through all these trials it has grown stronger in the affections of the people, and in the respect of other nations. The government of the Union is more firmly established to-day than at any other period of its history. The fears originally entertained of its encroachment upon personal and municipal liberties were long ago dissipated, and are now found only in records of the past. The partial independence and proper autonomy of the States have been uniformly respected by Congress. Very few instances are recorded in which the laws of Congress have been adjudged to be transgressions of their constitutional limit of authority by the opinion of the Supreme Judiciary, organized as it was with power to check possible excesses of central legislation. States and their subordinate municipalities move in their respective orbits with even greater harmony because of the supremacy, in its sphere, of the national legislature. Instead of a disposition to subtract a portion of the powers conceded to Congress, a strong inclination is found among citizens to increase them, with a view to a better control of the financial obligations of States and municipalities, and to meet the exigencies of a vastly enlarged commercial and social intercourse between the States. Many unforeseen conditions have arisen for which Congress has found no prescribed rule of action in the Constitution. But it has been held alike by political and judicial authority that the creation of this defined national sovereignty not only carried with it the powers expressly granted, but all other powers necessary and appropriate to defend this sovereignty against enemies, and to secure the declared objects of its creation. Thus, foreign territory has been acquired by both purchase and conquest, and organized as territorial dependencies of the general government. Insurrectionary and seceding

REPRESENTATION OF THE STATES IN CONGRESS, ACCORDING TO THE SEVERAL APPORTIONMENTS.

NOTE.—The following table shows the number of representatives in Congress as originally assigned by the Constitution and as apportioned under each census. The apportionment under the first census went into effect, March 4, 1793, and every ten years subsequent to this a new apportionment has taken effect. Numbers in parenthesis show the representation assigned to a State on its admission into the Union after the decennial apportionment had been made.

	Year Adm'd.	By Const.	1793.	1803.	1813.	1823.	1833.	1843.	1853.	1863.	1873.	1883.
Alabama	1819	.....	.....	.....	(1)	3	5	7	7	6	8	8
Arkansas	1836	.....	.....	.....	.....	.....	(1)	1	2	3	4	5
California	1850	.....	.....	.....	.....	.....	.....	.....	2	3	4	6
Colorado	1876	.....	.....	.....	.....	.....	.....	.....	.....	.....	(1)	1
Connecticut	.....	5	7	7	7	6	6	4	4	4	4	4
Delaware	.....	1	1	1	2	1	1	1	1	1	1	1
Florida	1845	.....	.....	.....	.....	.....	.....	(1)	1	1	2	2
Georgia	.....	3	2	4	6	7	9	8	8	7	9	10
Illinois	1818	.....	.....	.....	(1)	1	3	7	9	14	19	20
Indiana	1816	.....	.....	.....	(1)	3	7	10	11	11	13	13
Iowa	1846	.....	.....	.....	.....	.....	.....	(2)	2	6	9	11
Kansas	1861	.....	.....	.....	.....	.....	.....	.....	.....	1	3	7
Kentucky	1792	.....	2	6	10	12	13	10	10	9	10	11
Louisiana	1812	.....	.....	.....	1	3	3	4	4	5	6	6
Maine	1820	.....	.....	.....	.....	7	8	7	6	5	5	4
Maryland	.....	6	8	9	9	9	8	6	6	5	6	6
Massachusetts	.....	8	14	17	20	13	12	10	11	10	11	11
Michigan	1837	.....	.....	.....	.....	.....	(1)	3	4	6	9	11
Minnesota	1858	.....	.....	.....	.....	.....	.....	.....	(2)	2	3	5
Mississippi	1817	.....	.....	.....	(1)	1	2	4	5	5	6	7
Missouri	1821	.....	.....	.....	.....	1	2	5	7	9	13	14
Nebraska	1867	.....	.....	.....	.....	.....	.....	.....	.....	(1)	1	3
Nevada	1864	.....	.....	.....	.....	.....	.....	.....	.....	(1)	1	1
New Hampshire	.....	3	4	5	6	6	5	4	3	3	3	3
New Jersey	.....	4	5	6	6	6	6	5	5	5	7	7
New York	.....	6	10	17	27	34	40	34	33	31	33	34
North Carolina	.....	5	10	12	13	13	13	9	8	7	8	9
Ohio	1802	.....	.....	(1)	6	14	19	21	21	19	20	21
Oregon	1859	.....	.....	.....	.....	.....	.....	.....	(1)	1	1	1
Pennsylvania	.....	8	13	18	23	26	28	24	25	24	27	28
Rhode Island	.....	1	2	2	2	2	2	2	2	2	2	2
South Carolina	.....	5	6	8	9	9	9	7	6	4	5	7
Tennessee	1796	.....	(1)	3	6	9	13	11	10	8	10	10
Texas	1845	.....	.....	.....	.....	.....	.....	(2)	2	4	6	11
Vermont	1791	.....	2	4	6	5	5	4	3	3	3	3
Virginia	.....	10	19	22	23	22	21	15	13	8	9	10
West Virginia	1863	.....	.....	.....	.....	.....	.....	.....	.....	3	3	4
Wisconsin	1843	.....	.....	.....	.....	.....	.....	(2)	3	6	8	9
Total by Apportionment	.....	65	105	141	181	213	240	223	234	241	292	325
Added in ten years	.....	.....	1	1	4	.....	2	7	3	2	1	.....
Ratio of Representation	.....	30,000	33,000	33,090	35,000	40,000	47,700	70,680	93,423	127,381	131,425	154,325

States have been reclaimed to the Union by military force. New conditions have been imposed upon States newly admitted to the Union. Troops have been levied by conscription within the States. Paper money has received a forced circulation in time of war. State bank circulation has been suppressed by national taxation, and a national banking system has taken its place. A tariff has been provided not only for the object of raising a revenue, but also for the avowed object of protecting national labor and production.

The experience of the first century of the American Republic shows that the framers of this system were as wise in their general declarations as they were in their precise definitions of the powers of Congress. No nation, indeed, is wise which does not provide sufficient elasticity in its institutions to allow growth and development alike of its intellect and its interests. The prescribed garments of childhood cannot be worn in the maturity of years. Necessity has sometimes forced Congress to a large interpretation of constitutional powers. Their justification has been found chiefly in the unforeseen conditions. But such action has rarely failed to recognize the principle that this is a "government of the people, by the people, and for the people," and the people in turn have ratified the extraordinary measures. This people, conscious of their ultimate power of control, strong in the possession of that power, and frequently exercising it to rebuke neglect of their interests, have become fearless of usurpation, patient in their consciousness of strength, proud of their liberties, and loyal to their national Congress. (J. A. K.)

CONGREVE, RICHARD, an English political and philosophical essayist, was born at Leamington, Warwickshire, Sept. 4, 1818. He is the third son of Thomas Congreve, and was educated at Rugby under Dr. Thomas Arnold. He graduated at Wadham College, Oxford, in 1840, with first-class honors in classics. He became a fellow and tutor of his college, and was for a time an assistant master at Rugby. Returning to Oxford, he resumed his tutorship in Wadham College, but finally resigned it in 1857 on accepting the Positive philosophy of Comte as the best solution of the problems of human life. He has published a *History of the Roman Empire of the West* (1855), *The Catechism of Positive Religion* (1858), *Gibraltar* (1860), *Italy and the Western Powers* (1861), *Elizabeth of England* (1862), *Essays, Political, Social, and Religious* (1874). He edited *Aristotle's Politics, with Notes* (2d ed. 1874), and translated the fourth volume of Comte's *Politique positive*, which treats of religion. He resides in London, is the leader of the most active school of the Positivists, and preaches in their church. His essays on historical subjects favor an enlightened despotism. Without belonging to any of the existing political parties, he takes a warm interest in public affairs, and frequently publishes pamphlets and articles on questions of the day. In this way he has urged upon England the policy of conceding the demands of Ireland for home rule and of relinquishing the dominion of India.

CONIFERÆ (cone-bearers) is the name applied to a large and important group of trees or shrubs. The order may properly be divided into six tribes: *Cupressineæ*, illustrated by Cypress, Arbor Vitæ, and

Juniper; *Taxodieæ*, illustrated by Sequoia and Bald Cypress; *Taxineæ*, illustrated by Yew and Ginkgo; *Abietineæ*, illustrated by Pine, Spruce, Fir, Larch; *Podocarpeæ*, illustrated by Podocarpus; *Araucarieæ*, illustrated by Araucaria. These tribes are founded upon the more important characters of the fruits and flowers, and the thirty-two *genera* into which they are divided are based on less important structural characteristics. Though more numerous as to species and individuals in the north temperate zone, they are well represented, also, in the south temperate; and there are several species in the equatorial regions. Considered as a whole, with *Cycadaceæ* and *Gnetaceæ* they form the naked-seeded division of dicotyledonous plants. Taking the common pine tree as an illustration of the order, the cone represents an arrested branch. The bract under each scale represents the leaf; the scale, the transformed branch, which represents a carpel in Angiosperms; and the seed, instead of being enclosed by a carpel, are naked and exposed on the flat scale, the analogue of the carpellary leaf, as it is called, in other orders. The true leaves of the pine are united with the stem, forming an exterior cuticle to the bark, only the tips being free, and forming the bud-scales toward the end of the growing season. Sometimes these tips are more fully developed, and appear as perfect leaves. This is especially the case in the juvenile condition; in some Coniferæ, especially the arbor vitæ, this perfect foliaceous condition exists for the greater part of the first season of growth from the seed, and in some rare cases a tree will retain this juvenile condition for many years; and, as in the case of some junipers, the condition appears whenever a branch has lost some of its vital power by being shaded by other branches or in some other way deprived of its proper share of food. In the pine a secondary growth of leaves appears from the axis of the primary leaves. These are popularly known as "needles," and are sometimes in pairs, sometimes in threes, and sometimes in bundles of five, and have membranous sheaths at the base of the bundles. In the larch the branches are covered by small spurs, which form in the axes of the true leaves, and the leaves from these spurs are not united to the branch, for indeed it has not developed sufficiently to enable them to do so. The secondary leaves in the pine are evidently homologous with those on the spurs in the larch, and we may therefore say that pine needles are leaves produced from spurs which are not visible above the bark, as in the larch they are. The scales which surround the sheaths also exist in spurs of larches, and are the analogues of the primary leaves. The whole family of *Coniferæ* are formed on the type thus sketched, with various modifications. In some cases the seeds seem partially enclosed by the scales; at other times, as in the sub-order *Taxineæ*, to which the yews belong, the usually naked ovule is more or less enclosed by the development of a fleshy or more or less hardened disk. The seeds are albuminous, and in those forms in the order which seem to develop fully primary leaves have but two cotyledons; but in those which suppress the primary leaves and develop secondary ones, as in the pines, these cotyledons are usually in fascicles also. The wood of coniferous trees is marked with peculiar circular dots, by which it may be readily distinguished under a microscope even in a fossil state. It abounds with a resinous juice, which yields tar, pitch, rosin, and other commercial products. Of what peculiar use these resinous secretions are in the economy of plant-life has been an interesting question with biologists. De Vries believes they are for the purpose of furnishing a healing covering to wounds. Some of the family are comparatively short-lived shrubs, others form trees of majestic size and live to a great age. In Europe the yew, *Taxus baccata*, is often known to be 1000 years old and to reach 20 feet in diameter, and there are others which exceed these figures. In the Eastern section of the United States white pines often grow more than 150 feet high and 18 or 20 feet in circumference, but are not believed to be often more than 200 years old.

It is deeply to be regretted that the white pine, which has been of the utmost service to American civilization, has now so nearly disappeared from the Eastern States and is in danger of extinction in Michigan and neighboring States unless measures for its restoration as a forest tree be speedily taken. The rapidity of its growth, the ease of its culture, and the certainty of its finding a market are reasons which should ensure its cultivation and preservation. The conifers of California seem likely also to share the fate of the white pine—the redwood because of the demand for its timber, and the *Sequoia gigantea*, or mammoth tree, because of its very limited range. This disappearance is but a continuation of the history which the sequoia brings to us from the past. In earlier geological times it occupied a wide range in what is now Arctic region, and extended thence south to its present latitudes, both in the Old and in the New World. Associated in size and in home with the sequoias we have the sugar pine (*Pinus Lambertiana*), which derives its name from the sweet exudation furnished when it has been injured by fire. It is remarkable for its beautiful, straight, tapering trunk, its soft wood, and hence the ease with which it is worked—qualities which give it a high commercial value. *Pinus ponderosa*, or the yellow pine of the West, which ranges from Washington south through California and Arizona and eastward to Colorado, is perhaps the most widely diffused and most generally useful of our Western conifers. There are also the noble spruces of the West coast which form the well-known tall timber and long spars of Puget Sound; the Douglas spruce, attaining a height of 300 feet and a diameter of 15 feet. Among the firs of the same region we find *Abies grandis* (300 feet high and 4 feet in diameter), *Abies nobilis* (200 feet high), and *Abies magnifica* (200 feet high). The Coast and Cascade Mountain ranges produce the *Thuya gigantea*, or Western arbor-vitæ, often 250 feet high and furnishing a good, soft, durable timber. Much like this (save in its fruit) is the *Libocedrus*, or white cedar, of California and Oregon.

Among the important conifers of the Southern United States are long-leaved pine (*Pinus Australis*), short-leaved pine (*Pinus mitis*), loblolly pine (*Pinus tæda*).

The trees most useful to mankind are found among the *Coniferæ*, and they are found in some form or another over every portion of the world, except some of the more tropical parts of Africa and the southern peninsula of India. Nothing compares with them in general usefulness as timber-trees, and in a vast variety of products which serve human purposes no other class of trees will bear comparison with them. The number of species known is about 200, and perhaps it may be said that there is not one among them all but possesses some useful character. (T. M.)

CONKLING, Roscoe, an American Senator, was born at Albany, N. Y., Oct. 30, 1829. His father, Alfred Conkling (1789–1874), was a member of Congress,

afterwards United States district judge for Northern New York, and in 1852 was minister to Mexico. Roscoe, having received an academic education, removed to Utica in 1846, studied law, and was admitted to the bar in 1849. He became district attorney for Oneida county in 1850, and was elected mayor of Utica in 1858. He was originally a Whig, but on the formation of the Republican party became an earnest advocate of its principles. In 1858 he was elected to Congress, in which he was the youngest member of the House. He soon secured a reputation for eloquence and courage in debate, and was re-elected in 1860. Being defeated in 1862, he was employed by the attorney-general in exposing frauds which had been practised in New York with regard to soldiers' enlistment and bounties. In 1864 he was elected again to Congress, where he was made chairman of the committee on the District of Columbia and of a committee on a bankrupt law. He was also a member of the committee of ways and means and of the special reconstruction committee of fifteen. He strenuously resisted all measures tending to restore the advocates of secession to power in national affairs. After his election for another term by the people in 1866, the legislature of New York, in Jan., 1867, elected him to the Senate, where he took his seat in March. He was immediately placed on the judiciary committee, and during his senatorial career from 1867 to 1881 was a member of most of the leading committees. In 1876 he was a prominent but unsuccessful candidate for the Republican presidential nomination. When Pres. Hayes showed a disposition to accede to the demand of Southern leaders, Mr. Conkling was foremost in opposing the movement, and organized the "Stalwart" faction of the Republican party. In the Chicago convention of 1880 he was the champion of the nomination of Gen. U. S. Grant for a third term, but was again unsuccessful. Mr. Conkling assisted in the election of Pres. Garfield, but resented the appointment of Mr. Blaine, against whom he had a personal grievance, to the Cabinet. The breach was widened by Pres. Garfield's New York appointments and Mr. Conkling finally insisted on the withdrawal of the nomination of Mr. W. H. Robertson as collector of the port of New York. Unable to obtain this, he and his colleague, Thomas C. Platt, resigned their seats in the Senate, and appealed to the New York legislature for re-election as a vindication of their course. In this they failed. Mr. Conkling afterwards declined a nomination as justice of the United States Supreme Court, offered to him by Pres. Arthur. Mr. Conkling then engaged actively in professional work in New York City, thus acquiring a moderate fortune. He died April 8, 1888, from the effects of exposure to the blizzard of March 12.

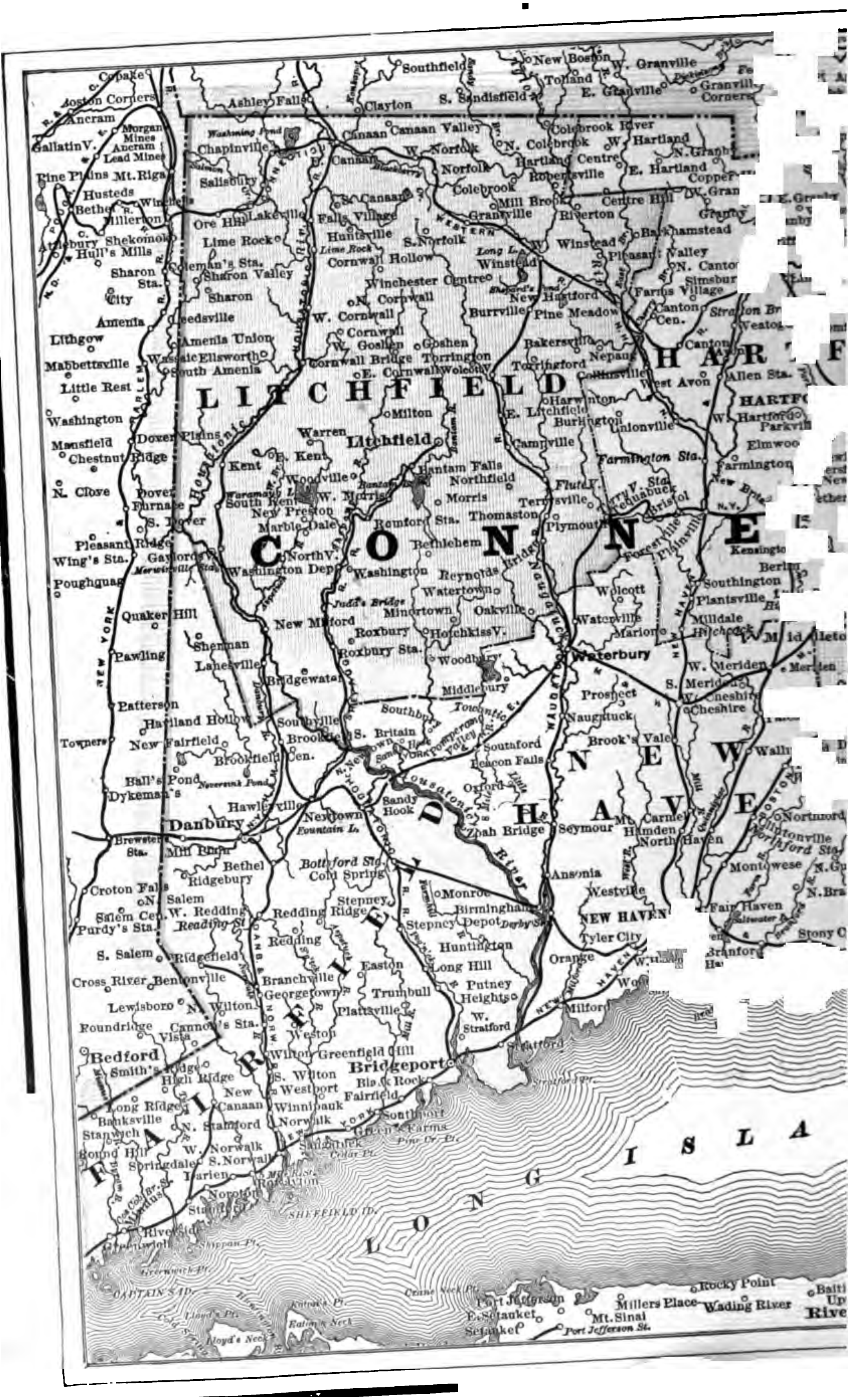
CONNECTICUT. The present constitution was adopted Sept. 15, 1818, and has been declared judicially to be a limitation and not a grant of power. The first article is a declaration of rights; the second divides the powers of the government into three distinct departments, the legislative, the executive, and the judicial. Formerly, the State had two capitals, Hartford and New Haven. This peculiar feature in the original organization was owing to the fact that the State was formed of two colonies, and when the union took place it was agreed that the sessions of the general assembly should be held alternately at Hartford and New Haven. This arrangement was observed for many years, but finally an effort was begun to abolish the capital at New Haven. The agitation was continued year after year; in 1874, however, the constitution was amended, and since that time all the sessions have been held at Hartford. Rhode Island is the only State in the Union having two capitals, but Newport is a capital only in name, as all the sessions of the legislature are held at Providence.

The legislature consists of two branches, a house and a senate. The members of the house represent territorial divisions or towns, thus corresponding in plan with the representation in the Federal Senate. Each town sends at least one representative, and if containing more than 5000 population, two. In no case has the representation been reduced, and all towns which ever sent two representatives have retained the number. Senatorial representation is based theoretically on population. The constitution provided that the basis of representation should be adjusted to conform with the changes in population, and that the adjustment should be made at the time of taking the national census. Fifty years ago the first apportionment was made under this provision of the organic law, but although the greatest changes have since occurred in the movements of the population there has been no readjustment in representation. The extraordinary condition of things now existing in consequence of neglecting to regulate senatorial representation in the mode prescribed has been thus set forth. "Districts which were substantially equal fifty years ago to-day show a difference of 4 to 1; others have grown so as to present differences of a less degree, yet quite enough to make equality of representation absurd. Six districts with a combined population of 83,500 balance in the present senate six other districts having a population of 281,500, while ten districts with a population of 411,700 can be out-voted by eleven districts which have a population of 199,000." The senate is composed of twenty-one members; it is therefore possible for eleven of them to control the legislation of the State. Obviously, representation in the lower branch, which has 244 members, should be reduced, while that of the senate should be increased, and thus remove the danger of having the course of legislation impeded by a mere handful of men.

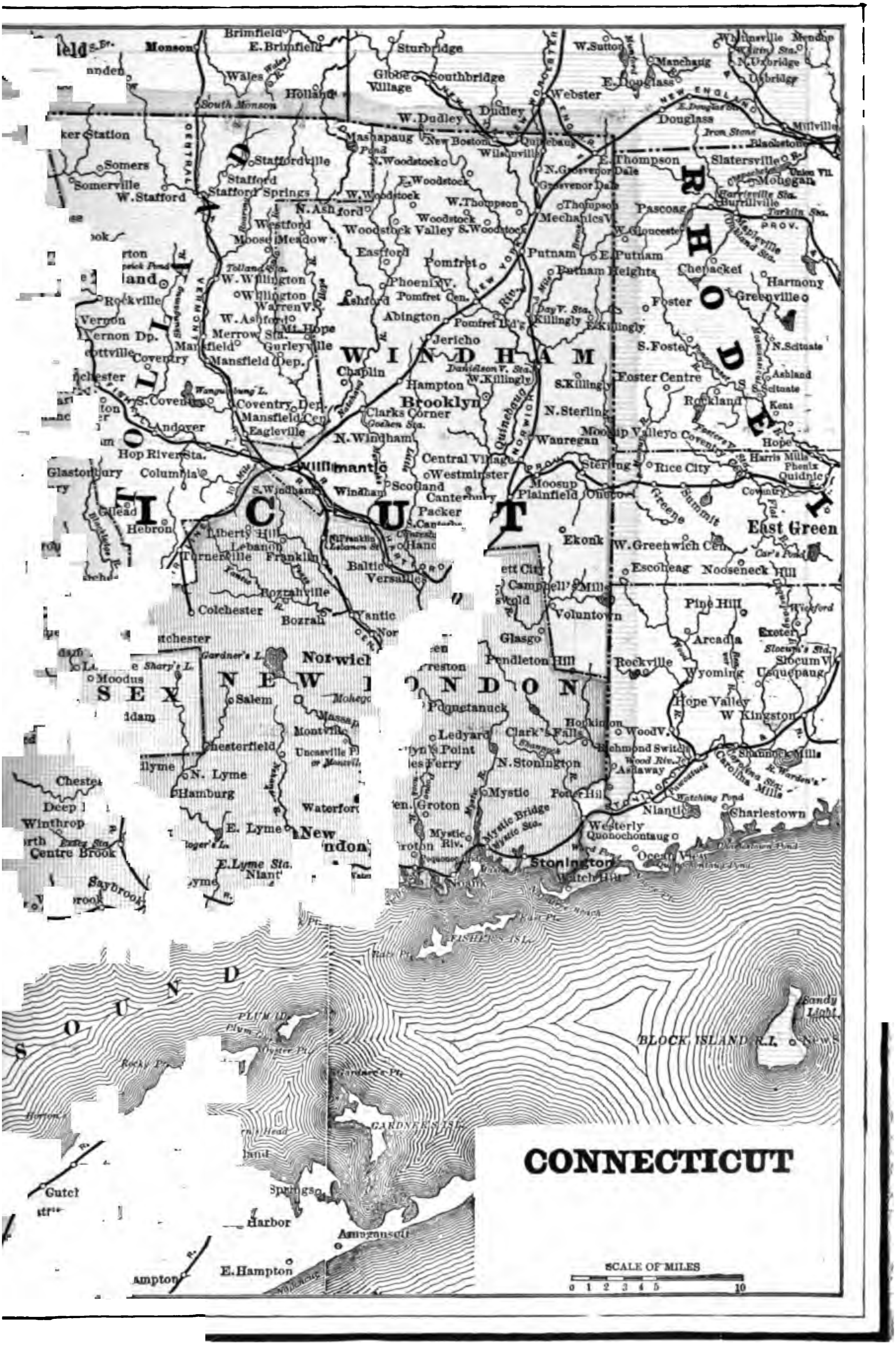
The executive is the second department of the State government. The machinery for executing the laws is very simple, yet effective. No attorney-general or other law-officer is elected or appointed to serve the State, and whenever legal assistance is needed it is paid for specially. There is, however, but little need of employing any one, and the State has never suffered from the want of a permanent law-officer. The governor, like the governors of other States, is vested with the veto-power, but the legislature can pass a bill by a bare majority over the governor's veto, as in the beginning.

Lastly is the judicial department. There are two courts having general jurisdiction in the State—the superior court, where causes are first tried; and the supreme court of errors, where a second trial can be had to correct any errors committed by the other. In the lower court cases can be tried before a jury if either party demands it, but usually, with the exception of criminal cases, they are tried by a judge. The time-honored trial by jury is falling into disrepute, and is likely to disappear, not by virtue of any legislative or constitutional enactment, but by the gentle operation of the causes now at work. The cases tried by juries are constantly diminishing in number, and this is as true with respect to other States as Connecticut.

The remaining articles of the constitution pertain to the qualifications of electors, religion, education, impeachments, closing with a few miscellaneous provisions



LITCHFIELD
CONNE
FAIRFIELD
NEW HAVEN
HARTF
LONG ISLAND
NEW YORK
Copake
Boston Corners
Ancram
Gallatin V.
Pine Plains
Mt. Riga
Husteds
Bethel
Millerton
Shekomeko
Hull's Mills
Sharon Sta.
City
Amenia
Lithgow
Mabbettsville
Little Rest
Washington
Mansfield
Chestnut Ridge
N. Clove
Dover Furnace
S. Dover
Pleasant Ridge
Wing's Sta.
Poughquag
Quaker Hill
Pawling
Patterson
Towners
Ball's Pond
Dykeman's
Brewster Sta.
Croton Falls
N. Salem
Salem Cen.
Purdy's Sta.
S. Salem
Cross River
Lewisboro
Poundridge
Bedford
Smith's Ridge
High Ridge
Long Ridge
Banksville
Stanwich
Round Hill
Springdale
Darien
Noroton
Stamford
Riverside
Greenwich
Southfield
New Boston
W. Granville
Tolland
E. Granville
Granville Corners
Ashley Falls
Clayton
S. Sandisfield
Canaan
Canaan Valley
Colebrook River
N. Colebrook
W. Hartland
Hartland Centre
E. Hartland
Chapinville
Salisbury
E. Canaan
W. Norfolk
Norfolk
Robertsville
Colebrook
Mill Brook
Riverton
Centre Hill
Lakeville
Falls Village
Granville
Ore Hill
Lime Rock
Huntsville
S. Norfolk
Winstead
Pleasant Valley
Barkhamstead
N. Canton
Sharon Valley
Cornwall Hollow
Winchester Centre
New Hartford
Sharon
W. Cornwall
N. Cornwall
Burrville
Pine Meadow
Canton Cen.
Leedsville
Cornwall
W. Goshen
Goshen
Bakersville
Amenia Union
Wassaic
Ellsworth
South Amenia
Cornwall Bridge
Torrington
E. Cornwall
Wolcott
Torringford
Nepaug
Collinsville
West Avon
Allen Sta.
Harwinton
E. Litchfield
Burlington
Unionville
Milton
Dover Plains
Warren
Litchfield
Campville
Farmington Sta.
Farmington
Kent
E. Kent
Bantam Falls
Northfield
Woodville
South Kent
W. Morris
Morris
Terryville
Pequabuck
Bristol
New Preston
Marble Dale
Romford Sta.
Thomaston
Plymouth
Forestville
Plainville
Gaylordsville
North V.
Bethlehem
Washington Dep.
Washington
Reynolds Bridge
Southington
Plantsville
Watertown
Wolcott
Judd's Bridge
Minortown
Oakville
Waterville
Marion
Milldale
New Milford
Roxbury
Hotchkiss V.
Sherman
Roxbury Sta.
Woodbury
Waterbury
Lanesville
Bridgewater
Middlebury
W. Meriden
Meriden
Prospect
Southbury
Cheshire
Patterson
Haviland Hollow
Southville
Naugatuck
New Fairfield
Brookfield
S. Britain
Southford
Brook's Vale
Brookfield Cen.
Beacon Falls
Oxford
Sandy Hook
Hawleyville
Newtown
Danbury
Zoah Bridge
Seymour
Mt. Carmel
Hamden
North Haven
Mill Plain
Bethel
Botsford Sta.
Cold Spring
Ridgebury
Ansonia
Westville
Monroe
Stepney
Birmingham
Derby
W. Redding
Redding Ridge
Stepney Depot
NEW HAVEN
Tyler City
Fair Haven
Branford
Stony C
Reading St.
Redding
Ridgefield
Huntington
Orange
Bentonville
Branchville
Easton
Long Hill
Georgetown
Trumbull
Putney Heights
N. Wilton
Plattsville
W. Stratford
Milford
Vista
Cannon's Sta.
Weston
Stratford
Wilton
Greenfield Hill
Bridgeport
S. Wilton
Westport
Black Rock
Fairfield
New Canaan
Winnipauk
N. Stamford
Norwalk
Southport
Green's Farms
W. Norwalk
S. Norwalk
Saugatuck
Sheffield I.
Port Jefferson
E. Setauket
Setauket
Mt. Sinai
Millers Place
Rocky Point
Wading River
Port Jefferson Sta.
Lloyd's Neck
Eaton's Neck
Crane Neck Pt.


CONNECTICUT
SCALE OF MILES
0 1 2 3 4 5 10
WINDHAM
NEW LONDON
RHODE I.
BLOCK ISLAND R.I.
GARDNER'S ISL.
FISHER'S ISL.
PLUM ID.
Willimantic
Norwich
Putnam
Brooklyn
Webster
Southbridge
Stafford Springs
Rockville
Stonington
Westerly
Mystic
Groton
Watch Hill
Charlestown
East Green
Plainfield
Moosup
Danielson V. Sta.
Colchester
Salem
Moodus
Amagansett
E. Hampton
Douglass
Blackstone
Millville
Pascoag
Chepachet
Harmony
Greenville
Foster
Foster Centre
Hope Valley
Wyoming
Usquepaug
Arcadia
Exeter
Wickford
Voluntown
Pendleton Hill
Ledyard
Montville
Uncasville
Waterford
Hamburg
N. Lyme
E. Lyme
Hebron
Andover
Columbia
Coventry
Mansfield
Eagleville
Hampton
Chaplin
Abington
Pomfret
Eastford
Woodstock
Thompson
Dudley
Sturbridge
Brimfield
Holland
Wales
Somers
Somerville
W. Stafford
Scotland
Canterbury
Packer
Baltic
Versailles
Franklin
Lebanon
Bozrah
Yantic
Sterling
Oneco
Ekonk
Escoheag
Nooseneck Hill
Pine Hill
Rice City
Hope
Kent
Quidnic
Niantic
Ashaway
Potter Hill
Clark's Falls
N. Stonington
Hopkinton
Ocean View
Quonochontaug
Shannock Mills
Carolina Mills
Richmond Switch
W. Kingston
Slocum V.
Centre Brook
Winthrop
Saybrook
Chester
Deep River
Chesterfield
Springs
Harbor

and with the mode of proposing and ratifying amendments. These must be passed first by the general assembly by a majority vote, and again the next year by a two-thirds vote, after which a ratification by the vote of the majority of the voters of the State is final. The constitution, therefore, carefully guards against innovations, yet provides a way for making them. The constitution has been amended sixteen times since 1828. No constitutional convention has ever been held, though the expediency of calling one has been warmly discussed.

The Constitution requires that candidates for State offices, in order to be elected, must receive a majority of the popular vote; otherwise the choice is left to the legislature. Hence in 1886 and subsequent years although the Democratic candidate for governor received a large plurality, the legislature, having a Republican majority, gave the office to his rival. In 1890 the Democratic candidate on the face of the returns did get a slight majority, but a dispute arose about their correctness, and Governor Bulkeley claimed the right to hold over until the dispute was settled. Democrats were elected to the other State offices.

The laws under which the people live are divided into two branches—statutes and decisions of the supreme court. The former are published annually, and there is a collection in a single volume, which is revised from time to time. The last revision was made in 1874 in a single volume of about 700 pages.

The decisions of the supreme court are contained in a single series of reports numbering forty-eight volumes. These do not include the single volume of Kirby's *Reports*, which is perhaps the oldest legal work of the kind existing in the country. Nor does this series include the two volumes reported by Root, nor the five volumes of Day, all of which preceded the present series. Five judges constitute the supreme court, and the written opinions delivered by them usually fill about a volume annually.

Besides these courts there are local tribunals, of which nothing need be added to what may be found elsewhere. The system for administering justice, therefore, is very simple yet effective. It may be added that the judges are no longer chosen by the legislature, but are appointed by the governor and confirmed by the senate of the general assembly. This change was introduced in 1880 by constitutional amendment. Their tenure of office still remains unchanged. It may be added that although their term of office covers no longer period than eight years, in only two cases have judges ever been dropped since the adoption of the elective system in 1856. When once elected they have been continued until reaching the constitutional limit of seventy years, unless they resigned. The two instances to which we have referred happened during the late war, when political feeling was intense. After its close one of them was re-elected by the legislature, and afterward was chosen chief judge by the unanimous vote of the legislature.

The expenditures of the State correspond with its simple government. During the year ending June 30, 1889, the total expenditures were $2,145,221, and the revenue for the same period was $1,923,894. The two largest items of this expenditure were for the judiciary and the common schools. The following is an abstract of expenditures for five years, ending Nov. 30, 1881:

	1877.	1878.	1879.	1880.	1881.
Session of the general assembly	$96,813.62	$88,865.32	$97,182.85	$104,896.23	$105,487.50
Salaries and expenses in executive offices	20,223.10	18,969.20	21,162.53	23,443.34	24,880.70
Judicial expenses	182,419.83	182,955.61	223,681.84	256,598.93	201,805.30
Board of prisoners in county jails	87,358.01	58,749.80	53,696.25	50,656.04	57,417.42
State-house	6,619.25	19,855.54	79,574.40	29,422.52	28,009.76
Contingent expenses	1,619.31	533.37	2,463.32	7,838.40	16,288.48
State board of education	8,382.70	9,077.09	9,253.29	9,944.50	11,221.27
State normal school	12,600.00	11,200.00	11,000.00	12,700.00	26,300.00
Common schools	207,504.50	211,745.50	210,682.00	213,420.50	219,851.50
State library	6,895.02	4,491.97	7,721.52	4,292.19	6,232.87
State prison	5,237.09	6,219.62	7,644.95	7,992.87	10,850.68
State reform school	34,288.00	29,672.93	32,686.60	49,435.91	51,468.18
Connecticut industrial school	19,297.03	20,332.77	21,666.91	34,516.48	45,800.21
State paupers	6,156.30	4,965.20	3,882.02	4,055.01	3,876.40
Humane institutions	128,436.90	81,727.35	89,851.32	157,705.31	177,680.45
Agriculture	8,750.00	13,600.00	13,000.00	13,200.00	13,100.00
National guard	82,464.73	65,960.97	150,200.08	113,097.49	119,512.34
Printing and circulating public laws and documents	29,861.48	23,597.81	20,544.16	28,758.76	32,031.16
Soldiers' children	20,646.75	14,739.60	11,947.21	9,003.02	7,787.16
Fish commissioners	2,104.91	1,605.50	2,416.20	3,521.65	4,718.24
State board of health	.....	750.00	3,000.00	3,000.00	3,000.00
Railroad commissioners	14,231.06	9,293.70	9,817.40	10,686.02	10,670.58
Bank commissioners	3,838.20	3,393.45	4,791.62	4,999.93	5,150.00
Insurance commissioner	16,634.63	14,012.93	16,036.92	15,104.15	14,011.13
New State-house	350,000.00	331,500.00	90,000.00	118,131.36	5,041.61
Grading Capitol grounds	.....	.....	24,750.00	26,250.00	4,000.00
Account of taxes refunded	512.80	359.84	26,058.39	43.00	271.21
State board of charities	637.52	.....	.....	.....	262.64
Sundry accounts	32,313.69	13,618.40	71.50	1,500.00	10,654.28
Total, not including interest paid on State bonds	$1,385,846.43	$1,241,793.47	$1,244,783.28	$1,314,213.61	$1,217,381.07

The expenditure for 1889, above given, includes 00,000 State bonds redeemed, the bonded debt, uich was nearly $5,000,000 in 1880, being reduced to 3,740,200. The debt consisted originally of five ans bearing 6, 5, and 3½ per cent. interest. The bonds bearing the lower rate amount to $500,000, and were issued in 1882. They were taken at a premium varying from 4 to 7½ per cent.

There is, however, a large debt owing by the towns and cities. Once in four years the comptroller of the

State is required to publish the returns made to his office of the indebtedness and expenditures of the towns, boroughs, and counties of the State. In 1880 these returns were published, from which we present the following interesting statement:

Counties.	Total funded indebtedness.	Total floating indebtedness.	Total debt.	Amt. actually raised by taxation during year.	Amt. actually expended for int. on total indebtedness during year.	Amount actually expended for roads.	Amount actually expended for paupers.	Amount actually expended for salaries.	Amount actually expended for schools.	Amount actually expended for police.	Amount actually expended for fire depart'ments.
Hartford.....	$2,076,294.10	$535,044.29	$2,613,338.39	$1,163,668.23	$122,808.43	$69,923.08	$100,258.13	$36,724.00	$188,268.00	$61.57	$1,158.26
New Haven..	1,339,553.77	188,767.00	1,528,320.77	654,816.10	94,962.80	93,954.63	123,482.50	25,214.24	322,712.54	235.75	138.26
New London..	1,107,807.94	363,040.71	1,470,848.65	400,120.63	90,543.42	53,254.25	58,313.90	13,488.72	109,633.06	5,406.66	1,485.66
Fairfield	975,554.40	205,856.61	1,184,391.01	500,369.86	66,349.32	54,992.38	70,939.80	19,027.37	205,174.21	1,379.23	1,126.26
Windham	43,055.00	109,103.31	152,158.31	155,172.12	8,734.73	37,953.85	26,696.98	7,847.36	60,020.85	.....	.....
Litchfield	589,150.54	145,857.42	735,007.96	290,042.58	47,610.52	61,469.50	28,717.96	14,388.08	84,799.95	144.99	.....
Middlesex	1,839,900.00	72,623.65	1,912,523.65	205,248.64	114,134.44	24,153.22	26,163.30	6,025.86	48,392.72	66.25	.....
Tolland	242,187.60	58,907.99	301,095.59	124,145.20	19,555.80	23,883.81	16,605.32	4,935.64	35,631.87	185.00	.....
Total, towns..	8,213,483.35	1,679,200.98	9,897,684.33	3,498,583.36	564,704.46	419,584.72	451,176.18	127,651.27	1,045,636.29	7,471	
Total, cities..	6,693,592.34	148,250.00	6,841,842.34	1,240,172.71	414,210.41	242,663.75	.....	90,113.75	.....	186,46	
Total, boro's.	451,600.00	98,283.12	550,083.12	85,643.50	28,960.58	22,430.13	.....	4,937.09	.....	4,76	
Tot'l, counties	24,500.00	41,889.50	66,389.50	90,346.40	3,093.79	.....	.....	13,618.22	.....	.....	
Total.....	$15,388,375.69	$1,967,623.60	$17,355,999.29	$4,914,745.97	$1,010,969.24	$684,678.60	$451,176.18	$236,320.33	$1,045,636.29	$198,886.17	$2

Though the State and county indebtedness is small, the cities and many of the towns are heavy debtors. Not all of the towns have discharged their war obligations, and many of them have incurred new ones in furnishing aid to railroad enterprises. The cities have sometimes borrowed money for the same purpose, but more generally to make local improvements, build sewers, bring in water, widen and pave streets, and the like. The aggregate indebtedness increased $204,672 during the four years mentioned, and the era of borrowing seems to have come to an end. Great benefits have come from this large outlay of money, but it may be questioned whether the expenditure should not have been made more slowly, and a larger portion of the sum required to make the needful improvements been drawn directly from the tax-payers at the time the expense was incurred.

It will be noted that the largest item, with one exception, among the State expenditures was for the support of the common schools. Connecticut has always been among the foremost States in establishing and maintaining a system of general education. The present system originated with the early settlers long before the union of the Hartford and New Haven colonies. A school existed in New Haven in 1639, and three years afterward an appropriation of £30 was granted to a school in Hartford which was then existing. The first code enacted by the Connecticut colony, which was in 1650, provided that every township of fifty households should appoint a teacher to "instruct all such children as should resort to him to read and write." A township of 100 families was required to maintain a grammar school. Subsequently, grammar schools were organized in each of the eight counties into which the State is divided, and land was granted to sustain them. In 1766 the towns were divided into school districts, and in 1798 school societies were created, which were invested with power to manage schools. This experiment did not prove successful, for the money granted to support the schools was not equally distributed, and the standard of education fell to a lower point. The system was afterward changed. All children from eight to fourteen years of age who are competent in body and mind must attend some public or private day-school at least three months every year. Of this period, six weeks must be consecutively spent in this manner, or else instruction must be given at home for an equal length of time in common-school branches. No child under thirteen years of age can be employed in any factory or similar employment. Children found unlawfully employed can be placed in schools. School visitors are required to examine annually manufacturing establishments, and to report all violations of the law to one of the grand jurors of the town. It is the special duty of the agent of the State b[oard] to require the observance of this law. The schools are supported by local taxation; by the income of the school fund, with the addition of $1.50 [for] each child from four to fourteen years old; by the income of the town deposit fund; and by that of any other town fund established or appropriated for the support of the schools. In order to receive their proportion of the public money, districts must have a suitable school-house, and must keep a record of [all] the children in the district between the ages mentioned, and of each one's attendance. [Towns] also have been taught at least thirty weeks in a year; and with twenty-four or more children of school age in a town neglecting or refusing to provide for them, one of its schools forfeits to the State a sum equal to the amount which it was required to raise for the support of it. In 1886 the legislature directed a text-book [on] physiology and hygiene to be prepared and distributed in the schools. This was done in 1887.

Not only has the State been solicitous for the education of the children living within its limits, but it has encouraged the habit of saving by providing facilities for the deposit of surplus money. Saving banks have been in operation for many years, and they are very numerous, and but few instances have occurred of mismanagement. The trustees have always served without reward, yet citizens have never been wanting who were willing to serve in that capacity and to devote the time and careful time to discharge their duties efficiently. The citizens of the State have always been deeply interested in managing these institutions. On [Jan. 1], 1881, the total resources of these banks were $[illegible]. In 1888 they were $111,816,976, of this $[illegible],850,078 represented deposits, and $3,[illegible]. The depositors numbered 287,776. The following statement of the number of depositors and the amount deposited by them in 1881 will show what a large portion of the population are interested in the savings banks—a proof of their general good management and far-reaching usefulness.

Number of depositors having $500 or less	176	
Amount of their deposits		
Depositors having over $500 and less than $1000	24,915	
Amount of their deposits		17,[illegible]
Depositors having over $1000 and not over $2000	17,792	
Amount of their deposits		24,
Depositors having over $2000	5,696	
Amount due to them		17,
Total number of depositors	235,366	

At this date, therefore, over one-third of the people of the State were depositors in these institutions, having an average deposit of $357.70. The dividends declared during the year aggregated $3,047,014, or a fraction over 4 per cent. The expense of managing this vast sum was less than one-third of 1 per cent. of the amount of the deposits. Four banks still exist under the State system, besides a considerable number of trust companies. All the other State banks adopted the national banking system, and their history is given under the article BANKING.

Though a large amount of the wealth of the State is invested in the manner described, no small sum has been expended in railroad enterprises; 1,006 miles having been built in the State by various corporations, whose capital stock on Nov. 30, 1889, was $63,213,608. The total debt of the railroads was $36,521,007. The total stock and debt of these companies were $99,734,815. 22,972,666 passengers and 7,729,549 tons of freight were transported in 1888. There are three railroad commissioners, appointed by the governor and confirmed by the senate, who hold their office for three years, on whom considerable powers are conferred. The lay-out and location of railroads must be approved by them, also the place and manner of connecting with or crossing other railroads, the crossing of highways and water-courses, the construction of fences, cattle-guards, warning-boards, speed of trains, and the establishing of ns. Not only must the commissioners examine condition of the railroads, their bridges, rolling- k, and property generally, but they are clothed with thority to make many recommendations to the com- es, which it is expected they will heed. The rail- s are required to make full returns annually of their ations and financial condition, and these furnish a s for the tax which is levied on them. The amount axes paid for the year ending Oct., 1881, was 9,818, and the dividends were $2,575,071. Of this sum, $1,550,000 were paid by the New York and w Haven Railroad.

Turning now to the agricultural interests of the State, may be remarked that, like all the New England tes, a large portion of the soil is not very productive very easily tilled. The Connecticut Valley, how- forms an exception, for there rich crops are raised arming is a profitable business. Tobacco of excel- quality has long been cultivated throughout this In 1880, 8666 acres were devoted to this crop, and 14,044,652 pounds of tobacco were produced. The value of the crop in the hands of the producers was estimated at $1,929,982. The cost of production per 100 pounds has been reckoned at $5.25, and $9.14 as the value of the product. The number of farms in the State in 1880 was 30,598, an increase of 20 per cent. during the preceding ten years, Of these, 27,472 were occupied by their owners, 1920 were rented for a ed money rental, and 1206 for shares of the product. ie minuter subdivision of the soil is an indication of tter cultivation. The cereal production is small com- red with that of many other States, yet is worth giving:

Crops.	Acres.	Bushels.
Barley	575	12,286
Buckwheat	11,231	137,563
Indian corn	55,796	1,880,421
Oats	36,691	1,009,706
Rye	29,794	370,733
Wheat	2,198	38,742

With respect to manufactures, those of Connecticut have long been noted both for their variety and value. In Litchfield county is the celebrated Salisbury iron ore, which has been used for 150 years. As early as 1734 a bloomary-forge was erected near the location of this ore-bed. Fourteen years later another forge was erected at the village of Lakeville in the same county, which was in active operation for many years. In 1768 it was sold to Richard Smith of Hartford. He was a royalist, and fled to England after the war of the Revolution broke out, but his furnace produced large quantities of cannon-balls, shells, etc., for the Continental army. Twenty-seven furnaces have been built and operated within a radius of thirty miles of Lakeville. "At the close of the eighteenth century Litchfield county contained fifty bloomary-forges making iron directly from the ore, and three slitting-mills. At the same time the county was so prominent in the manufacture of nails that only Plymouth and Bristol counties in Massachusetts, of all the nail-making districts in the country, exceeded its production. The iron of Litchfield county is now entirely used for foundry purposes, and most of it in the manufacture of car-wheels." The number of establishments in 1880 was 19, and the amount of the capital invested in the business was $2,682,000; 685 persons were employed, their annual wages amounting to $331,184, and the value of the products sold was $1,998,698. During the year 38,061 tons of iron were produced.

In manufacturing firearms and ammunition Connecticut leads every other State in the Union, though Massachusetts is nearly as large a manufacturer. For a long period the former State has been engaged in this branch of manufacture. The ingenuity of persons thus employed for many years was devoted to making arms with exchangeable parts. By many this was regarded as impracticable. But long ago all difficulties were surmounted. It is stated that Col. North of Middletown in that State commenced the manufacture of pistols whose lock-parts were made so uniform that it was not necessary to assemble and fit them soft as had been the usual practice. Of the 38 establishments in the country when the last census was taken, 12 of them were in Connecticut, having a capital of $8,315,289, employing 4579 persons, and paying in total annual wages $2,560,089. The value of their products was $5,618,636. Of the $834,000 of capital invested in the manufacture of ammunition, $724,000 is invested in Connecticut. The products for 1880 amounted to $1,706,852.

Connecticut is extensively engaged in the manufacture of cotton and woollen goods, but from an early date she has taken a peculiar interest in the production and manufacture of silk. Legislation even so early as 1732 showed that the industry had already made some progress. The first coat and stockings made of New England silk were worn by Gov. Law in 1747; the first silk dress was worn by his daughter in 1750. Dr. Ezra Stiles, president of Yale College, began a long series of experiments in 1758 by planting three mulberry trees. He kept a record of the growth, treatment, and product of the silkworms, which has been preserved. The experiments were continued until 1790, and during this period Dr. Stiles liberally distributed seeds, eggs, and advice. "He was successful in planting mulberry orchards at New Haven and Mansfield, and laid the foundation in the latter town of an industry that lasted three-fourths of a century, and paved the way for the present silk manufacture in this country." From these undertakings the industry arose, and though periods of depression have occurred, yet in 1880 Connecticut ranked as the third silk-manufacturing State in the Union,

surpassed only by New Jersey and New York, and nearly approaching to the latter in the amount of capital employed. There were 28 establishments; $4,436.000 of capital were invested in the manufacture; 3766 persons were employed, who received annually as wages $1,026,530. The value of the products of these establishments was $5,438,075.

To describe even briefly all the industries of the State would require many pages. The fishing industry, however, is worth mentioning, for 3131 persons were employed in it during the year 1880, and the capital invested amounted to $1,421,020. The oyster trade forms a very prominent feature. New Haven, including the places in its immediate vicinity, is the chief point whence the trade is carried on. At the date last mentioned 1006 persons were engaged in the business.

During the decade from 1870 to 1880 the population increased from 537,454 to 622,700. Of this number, 492,708 were native born, the rest, 129,992, were foreigners. The division by sex was—305,782 males and 316,918 females, an excess of more than 3½ per cent. of females. Classified by race, there were 610,769 whites and 11,547 colored persons.

In 1890 the population had increased to 746,861. By the U. S. census of that date the populations of the principal cities were as follows: New Haven, 85,981; Hartford, 53,182; Bridgeport, 48,856; Waterbury, 28,591; Norwich, 22,331; Meriden, 21,230; Danbury, 19,385; New Britain, 19,010; Stamford, 15,685; New London, 13,759; Greenwich, 10,120; Middletown, 9,012; Rockville, 8,805; Willimantic, 8,603; Manchester, 8,217; Bristol, 7,374; Putnam, 6,511; Naugatuck, 6,219, with a considerable number of smaller towns, the inhabitants of the State being devoted to manufacturing pursuits. (A. S. P.)

CONNECTICUT RIVER, the largest river in New England, rises on the borders of New Hampshire and Canada, flows in a general southerly course, and empties into Long Island Sound at Saybrook, Conn., in 41° 10′ 15″ N. lat. and 72° 21′ W. long. Its Indian name, Quonektacat, means "Long River." Its source, 1600 feet above the level of the sea, is near the border of Coos co., N. H. One of its branches forms the boundary between Canada and New Hampshire to the 45th parallel of N. latitude. The main stream passes through Second and Connecticut lakes, after which it flows W. and S. W. to the border of Vermont, where it is 150 feet wide. Thence it flows generally S. S. W., forming the boundary between Vermont and New Hampshire and soon attaining a width of 390 feet. It flows through the western part of Massachusetts, being there from 450 to 1000 feet in width. It divides Connecticut into nearly equal portions; below Middletown its direction is S. E. Its entire length is over 400 miles. There are numerous falls in its course, the chief, in order from N. to S., being Fifteen-Mile Falls, White River Falls, Bellows Falls, those at Montague and South Hadley in Massachusetts, and at Enfield in Connecticut. The abundant water-power furnished by the falls is utilized in numerous factories. Several canals have been made around the falls, and boats of 8 tons burden can thus ascend the river over 250 miles. Above Hartford there are many bridges. The entire valley of the river is about 300 miles long and 40 miles wide. It is noted for its beautiful scenery. In the lower part the meadow-lands are annually overflowed, and thereby are rendered highly productive. The tobacco from these lands is especially noted. (See Vol. I., p. 122). The principal affluents of the Connecticut are the Upper and Lower Ammonoosuck, in New Hampshire; the Passumpsic, the Wells, White, Black, and Williams, in Vermont; the Deerfield, Westfield, Miller's, and Chicopee, in Massachusetts; and the Farmington, in Connecticut. The Connecticut was long noted for the excellence and abundance of its shad and salmon. In this century the latter disappeared and the former were greatly diminished in number. In recent years considerable success has attended efforts to reintroduce them.

CONNELLSVILLE, a borough of Fayette co., Pa., is on the Youghiogheny River, 57 miles S. of Pittsburg and at the intersection of the Baltimore and Ohio Railroad, the Fayette co. branch of the Pennsylvania Railroad, and the Pittsburg and the Youghiogheny Railroad. It is connected with the village of New Haven by a suspension bridge. It is the centre of a bituminous coal region, and its coke is unsurpassed in the world. It has 2 banks, 2 weekly newspapers, 8 churches, several schools, locomotive-works and car-shops of the Baltimore and Ohio Railroad, several foundries, a paper-mill, pottery, and a woollen-mill. Col. William Crawford, one of the first settlers here, was a friend of Gen. Washington, and purchased for him large tracts of land in this vicinity. The borough was incorporated in 1306. Population, 5623.

CONNERSVILLE, the county-seat of Fayette co., Ind., is on the Whitewater River and Canal, 60 miles S. E. of Indianapolis, on the Cincinnati, Hamilton, and Indianapolis Railroad, the Fort Wayne, Muncie, and Cincinnati Railroad, and the Whitewater Valley Railroad. It has a fine court-house, 3 hotels, 2 banks (1 national), 2 weekly newspapers, 5 churches, 2 schools, gas- and water-works. It has 2 flour-mills, 4 furniture factories, a knitting-mill, and a foundry. It was settled in 1814, and incorporated as a city in 1868. The property is valued at $2,000,000, and there is a public debt of $11,000. Population, 4537.

CONQUEST. See ANNEXATION.

CONRAD, ROBERT TAYLOR (1810–1858), a
delphia dramatist and orator, was born at Ph
June 10, 1810. While a student of law he
tragedy, *Conradin of Naples*, which was highly
ful. In 1832 he became editor of the *Daily*
a paper which he afterwards merged in the *I*
Gazette. In consequence of ill-he
to give up his editorial labors, and
of law. In 1835 he was appointed
delphia, and two years later was elected
again returned to practice at the bar, and t
inent part in politics, acquiring a high rep
eloquent and effective public speak
Aylmere; or, The Bondman of K
through the personation of the
Jack Cade, by the eminent acto
After it had been performed se
published in 1852, together with
cluding sonnets on the Lord's Prayer.
Conrad was elected first mayor of t
of Philadelphia by the Americ
Philadelphia, June 27, 1858.
Poems were edited by his friend,

CONSCIENCE. (Latin—
together, and *scio*, I know.) By
denotes *knowledge whose object*
common. At first its meaning may have
with *consciousness*; but, historically, the
latter word has moved towards a large
the application of the word *conscience* has
rowing itself. *Consciousness* has thus b

name of the flow of experience, which is concrete in the individual subject. Its form is universal; its content is subjective-objective. On the other hand, the word *conscience*, in its historical evolution, has excluded from its range of application other forms of knowing and objects of knowledge, and always refers to those peculiar experiences which are now called *moral*. Its etymology implies that the transient or ephemeral in human knowledge has been sifted out, and that the imperishable *residuum* is a common human possession. But while the word *conscience* is often used in this large and loose sense, as covering all moral experience whatever, actual or discoverable, it is also used in a narrower sense by many systematic thinkers; and differences of opinion and disputes as to its application have been numerous. Of course under ethical systems radically distinct, the difference in the application of the term is likely to be more than verbal; yet even here, perhaps, the word might be retained to indicate something held in common by the utilitarian, intuitionalist, evolutionist, or even sentimentalist.

Every one must approach an inquiry into its meaning with certain preconceptions, with certain psychological notions. An endeavor must be made, therefore, to harmonize these preconceptions, to find some firm common ground whence to extend our outlook. We shall attempt, first, an analysis and description of moral facts, and then see how variously and to what different elements of this description the word *conscience* has been applied, and to what it is wisest and best to apply it. Even this may turn out to be a vain endeavor. The German philosopher Richard Rothe, in the revised edition of his *Theological Ethics*, excludes this term (*gewissen*) from his work, though in the previous editions he had attempted to describe it, declaring it to be "scientifically inadmissible, inasmuch as it is devoid of accurately determined logical contents, and is but a popular expression for the collective nature of man." Yet by showing the various senses possible for the term, and fixing a clear thought for each, we may see distinctly what we have to choose between and thus strengthen the right usage.

I. Under all ethical theories it is acknowledged that there is some rule or standard by virtue of which a man finds that a distinction between actions possible for his freedom, or seeming freedom, exists, in consequence of which he applies the words "right" or "wrong" to the two sides of some alternative. That all men make and think these distinctions all acknowledge, even though they differ entirely as to the ground or as to the origin of the distinctions themselves. Such a faculty, which apprehends, no matter why, whence, or how, this rule, standard, criterion, norm (whichever word may turn out to be the best to express it), whereby a distinction between actions actual or proposed is acknowledged, may have a name, and we will call it, provisionally, x. That it exists is not a reflective judgment. If a judgment at all, it is spontaneous, and that would bring up an inquiry as to its genesis. Such an immediate apprehension or spontaneous judgment is an *intuition*. If the word may not be applied here, to this direct envisaging, it is useless, and should be discarded altogether.

Whatever differences may be among intelligences, as to mental power or insight, there does not seem to be any difference whatever in this one respect, the consciousness and acknowledgment of the existence of a standard of comparison, any more than there is difference in their perception by sense of distinctions in color. All are alike then in this respect; and the most untutored savage is as firm and undoubting in his apprehension as the philosopher, while they may absolutely contradict each other in asserting that this or that action is in correspondence with the standard. The acknowledgment of the existence of such a standard or norm is entirely independent of all questions as to its origin, and also of all degrees of clearness in the understanding of its content. These degrees are not in the apprehension as a relation, or as a mode of immediate soul-activity, but in that which is apprehended. The savage may only know it as an obscure feeling or presence, or he may have some thoughts about it. At the other extreme of intelligence, it may appear as a well-defined ideal state, to be reached at some point of future time, or possible to be reached. Since, thus, there are degrees in the distinctness of that which is apprehended, the growing, enlarging content of that which is intuited, it is evident culture and reflection may improve this insight Under such discipline the mental gaze, though no more real, may become steadier and more penetrating and productive. In all concrete humanity the fluctuations of this object of the moral intuition are indubitable, inevitable, oscillating, retrograding, or progressive. It is a *fact*, as the changing flow of consciousness is a fact, and the resultant of the entire human experience, and of all modes of soul-activity whatever. This consciousness, thus changeable as to the clearness or the fullness of the content of the moral norm, is manifestly quite another thing than the consciousness of the mere existence of *a* norm, and should have another name. As we called that x, let us call this, provisionally, y.

When, however, we undertake to scrutinize actions, actual or proposed, in order to pronounce them right or wrong; endeavoring, in order to understand the action, to discover the motive—*i. e.*, the purpose or end, the thing or state sought to be attained—and the motive spring, *i. e.*, the reason why we propose to seek it or attain it, then it is evident that we are engaged in a precise and definite inquiry, in a process in which there may be all degrees of skill and proficiency. This differing facility will depend largely upon the native or acquired ability to trace the results of actions, and to see whether they have been done or proposed with the foresight of these results, or with forecasting of some other result. Thus there will be, also, differing degrees of skill and proficiency in comparing the action thus described with the standard or norm, variant not merely with the understanding of the action but with the understanding of the norm, though the kinds of variation in the latter be few, while in the former they will be unlimited. That the proposed action is thus brought into relation with the norm, that the norm is held up before it to furnish the condition for judging it, is an activity not identical with x or y, and which we will call, provisionally, z. The acquired skill in making a correct and trustworthy judgment, derived from the three-fold sources of understanding (1) the action, and (2) the norm, and from the habit of bringing them into relation, and the mode of consciousness derived from and including this acquired skill, is another fact or condition, not identical with x, y, or z, which we will call, provisionally, m.

Again, we may note among men a difference in the propensity or the willingness to undertake this comparison, and hence degrees of acquiescence or satisfaction in the result of it; or degrees of avoidance of

the contemplation of such result; that one is apt and quick to try his conduct, and that the other postpones or shuns the trial; that one accepts the decision and acts upon it, while the other turns a deaf ear and endeavors to escape it. These are differences in character which have their own origin and explanation, and are called by familiar names. In our description this is not identical with what we have named before, and so, in our symbolical language, we may call, provisionally, the disposition to make the comparison and to acquiesce in or avoid the results, n, and $n+$, and $n-$. Or we may seize the feeling which accompanies this act of going forwards or retreating, of seeking or shunning (for the feeling accompanies, and is not identical with the propensity, nor is measured by its degrees, and moreover has its own analysis and description), and indicate it as o, and $o+$, and $o-$; or we may abstract the feeling (not identical with that just referred to), which accompanies the discovery that the action done or proposed is in correspondence with the norm, of complacency, or in violation of it, of disturbance, and call it severally p or q.

These modes of consciousness which we have called y, z, m, and n, are not only not identical, but they do not run *pari passu* with each other; that is, the skill in tracing the consequences of actions, in coming to understand them more or less completely, and thus the attainment of results of value in making comparison with the norm, is not measured accurately by the degrees of propensity to make the comparison, nor even by the degrees of distinctness with which the norm and its implications are perceived; although these powers, propensities, and determinations must, of necessity, act upon and modify each other, helping or hindering. A man inclined to examine himself, and with whom the task of moral scrutiny has become habitual, will indeed come to see the ideal standard more distinctly, and will grow in ability to make correct comparison of actions with it. Here is room for unlimited training. Not only may the will, the power of quick and persistent movement, be trained by such discipline, but the intelligence may be amplified by the search for and the use of favorable conditions, insomuch that all knowledge whatever may help moral knowledge. And besides, the habit of obedience to the requirements of the moral standard or rule of action has the effect to lay the mists of prejudice, to calm the perturbations of the soul atmosphere, to clarify the same, and open out the distances, as well as to give an increased power of penetrating vision.

We have here appealed to observation, to the common unbiased human consciousness, and endeavored to describe the states, activities, facts, accurately, independent of any inquiry into their origin; without even claiming the existence of authority or using the word "law," in order to see if we could not reach conclusions admitted and valid under any, or independent of all ethical systems. Every conscious subject must compare his own with the consciousness of the past, as reported, and with that of his contemporaries, having faith more or less in the veracity of either, in the trustworthiness of human testimony. The utmost success that can ever be attained in the endeavor to penetrate the pre-historic period is the venturing forth of an hypothesis, which must undergo the trial to see whether it can be adjusted to everything else that we know. To attempt to discover the origin, and to trace the development without the clearest and fullest analysis and description of the developed and contemplated object, is an evident *hysteron proteron*. How accurately to make this description is entitled to be one of the first inquiries of the human mind: one essential to man's welfare, one to which men are driven by practical expediency or necessity, and which by no means can be postponed to take its place in a purely intellectual system. Men are urged to it by an impulse so imperious that it is no wonder that some have called it a *law* and others an *instinct*. The language invented by men at the early periods of their history, and under the *naïveté* of primitive conditions, before overmuch swayed or perverted by systems, or by mental prejudices, should be carefully noticed. The words *right*, *duty*, *obligation*, *remorse*, etc. (equivalents to all, or some, of which are to be found in all languages), exhibit a somewhat advanced stage of mental development, beyond which we have ourselves no whit proceeded. We have no intenser conviction of the truth of what is meant by these terms than those who invented them; though, indeed, very slowly light has been shed upon their implications, as they have moved out of the dim but unclouded twilight into the morning of sunshine, and storms, and obscurations. The theory of Mr. Herbert Spencer, that these intuitions, or spontaneous judgments and feelings, have been derived through tendencies to prudential or harmful actions, slowly strengthened or weakened, modified and inherited; or the theory of Prof. Alexander Bain, that they are inferences and habits of thought engendered by the existence of authority in the family and the social structure; these are theories which, if claiming to be sufficient, can never be proven, though there may and must be elements of truth in each which give them plausibility. The failure of either to account exhaustively for our entire moral experience is conspicuous. Whatever be the origin and the history of our moral consciousness, the existing condition of the same has as good, nay, a better right to be considered as valid and true than any prior condition, could the latter be fully recovered and examined. Indeed, the more advanced the development, the easier to discover the meaning, to conjecture the final cause, to forecast the possible end to be reached. It is the end or result to which the human race is tending which alone can give us the key to understand its present or its past; and of this no one is more convinced than the philosopher of evolution. The category of "final cause" is implied and acted upon in the very attempts made to disprove it by those who deny it.

II. Supposing then our observation of the consciousness to be so far correct, and our a[illegible] description complete enough for the [illegible] shall we apply the word *conscience*? To w[illegible] mination of consciousness, to what faculty o[illegible] soul-activity, to what judgment, sense, or fe[illegible] we adjust and confine it? Or shall we [illegible] it [illegible] accurate and clumsy way, to be so w[illegible] as to mean any of these, or all of [illegible] Before making this endeavor one truth m[illegible] and pronounced. Conscience, as a concr[illegible] or fact, cannot be found to be merely a [illegible] ing, or a mode of feeling; it cannot be a[illegible] being abstracted, but must be both [illegible] vorcing knowing and feeling. T[illegible] make the abstraction is vain. In a[illegible] *conscience*, then, we must be pre[illegible] a form of knowing, a mode [illegible] accompanied by, envelop[illegible]

the former grew out of the latter it never loses the trace of its birth.

After all, the popular use of the term may be the wisest and truest, the most in accordance with the naïve notions in which the word originated; therefore entitled to be adopted by the most profoundly thinking philosopher. And surely the most frequent use of the term, and the essential element implied, even when it is used in a looser sense, is to denote that mode of soul-activity which we have denominated *z*; that is, the active process of comparing the action done or proposed with the norm to discover whether it will meet the test of conformity to its requirements, thus to form a judgment. This process includes, of course, the completest possible understanding of the action itself: (*a*) in its purpose, or motive, or end; (*b*) in its motive-spring, that is, the reason why such a purpose is set; (*c*) in its tendency or results so far as they can be traced, and (*d*) the clearness or certainty with which such results have been or can be perceived by the doer. The making of this comparison becomes facile, and increasingly successful from habit; since, thereby, from frequent and constant scrutiny the norm itself, the law, the moral ideal is by degrees illumined, and comes to be more clearly and fully understood.

If *conscience*, then, be used to denote the activity of the soul in making such comparison to reach a judgment therefrom, it would seem that there will be many degrees of ease and success in this endeavor, arising from various causes, and thus, with this signification, it will be true that conscience may be trained, cultured, and improved. This legitimates the familiar use of such epithets as "a blind conscience," "a seared conscience," "a dull conscience," etc.

At first sight this might be taken to be the use of the word by Kant when he calls it "man's practical reason, which does in all circumstances hold before him his law of duty in order to absolve or condemn him," for it would seem that in order to absolve or condemn him it must have knowledge (1) of the action, and (2) of the standard of comparison. Yet this sense of the word "conscience" is not that indicated by Kant's other words shortly following: "An erring conscience is a chimera, for although in the objective judgment whether or not anything be a duty, mankind may very easily go wrong, yet, subjectively, whether I have compared an action with my practical (here judiciary) reason for the behoof of such objective judgment does not admit of any mistake; and if there were any, then would no practical judgment have been pronounced. He who knows within himself that he has conducted himself agreeably to conscience, has done all that can be demanded of him relatively to guilt or innocence. His obligement can extend only to the illuminating his understanding as to what things are duty, what not. But when it comes to the act, or when a man has acted, conscience speaks inevitably. We cannot for these reasons say that a man ought to obey his conscience; a case where he would require a supplemental conscience to control, and take cognizance of the acts of the first. The only duty there is here room for is to cultivate one's conscience, and to quicken the attention due to the voice of a man's inner monitor." In all this the word seems to mean only the holding up the standard for comparison, condemning or acquitting thereby. If, however, it can only this, as before, how can it condemn or acquit the action be understood? If it be mistaken, when conscience may go wrong in its acquittal or condemnation. So, too, if the norm itself be imperfectly or wrongly apprehended. Kant's "conscience" is thus a purely subjective thing, even though the moral idea or law be objective and universal; and not to "err" means only to be true to its subjectivity, which, however, by his own acknowledgment, may be quite other than the objective "conscience" of the universe. This use of the word can never be adjusted to popular thinking, and it is not a necessity or an aid for philosophers so to use it.

The propensity to use it in this sense is to be found among all intuitionalists of one class (those who hold *good* to be a simple idea), and all sentimentalists, believers in a *moral sense*, whether simple, or derived and compound. The immediacy of most moral judgments, and the acknowledged unerringness of many judgments, strike these philosophers so forcibly that this, the ready word, is seized to indicate and express it; and hence the conviction "conscience cannot go wrong." But inasmuch as there *are* wrong moral judgments (which even these philosophers confess), the word in such case comes to be inadequate, lacks universality of application; and the task of accounting for such judgments is for them more difficult, requiring a circuitous phrascology, than for other classes of philosophers—the utilitarians, or those rational moralists who hold good to be a complex idea; who therefore are rather inclined to use the word in the sense first indicated.

III. To give here the exact sense, as used by every, even distinguished, author, would be impossible or needless. But we can indicate the use in the great representative systems, as modified in its meaning more or less, by the essential peculiarities of such system. We shall therefore briefly advert to (1) the system which holds to a moral sense (Shaftesbury, Hutcheson); (2) the system of instinct (Adam Smith); (3) the autonomic system of Kant, and its supplement by Fichte; (4) the system of pure intuitionalism (Price, Calderwood, *et al.*); (5) egoistic hedonism (Hobbes, Bentham); (6) altruistic hedonism (Mill, Sidgwick, *et al.*); (7) the theory of Prof. Bain; (8) evolutionism (Herbert Spencer); (9) those rational systems which hold good to be a compound idea, and give various definitions of it (Malebranche, Jouffroy, *et al.*); and (10) a possible eclectic system which aims to detect, preserve, and combine the elements of truth in each and all of the foregoing. Besides this we shall advert to the views of certain great writers among the Greeks, and the moderns, and to the modification of the idea expressed by the word in Judaism and Christianity.

The view advocated by Shaftesbury, Hutcheson, and others, the phraseology of which is frequently met with in unsystematic writings, which holds to the existence of a special sense, called the *moral sense*, acting with the precision and unique application of the physical senses, may and does call this sense, or its activity, by the name *conscience*. Bishop Butler has been accused of holding this view, but it is easier to interpret his language as implying a rational solution. The system of Hume, too, which is a compound of utilitarianism and sentimentalism, acknowledges that the discovery of the utility of an action, or the opposite, appeals to a particular capacity of feeling which can thus be affected agreeably or disagreeably. If the word "conscience" is used under any of these systems, it must always mean the sense itself as a capacity, or potentiality, or as an activity.

If the refutation of this theory of a moral sense be

accepted, as showing that good and evil are not thus infallibly detected, and that differing moral judgments cannot be accounted for thereby, of course the correctness of this use of the word can no longer be maintained. The ease and quickness with which moral judgments are formed in most cases, the intense conviction of their truth, and the almost universal acquiescence in the same, indicating both a uniform standard of comparison and an entire agreement in the understanding and definition of the action judged, all this shows that a habit has been formed, inherited, and cultured, of judging with such alertness as to elude the ordinary unphilosophic, or even the philosophic, consciousness; that the actual process, discoverable by patient analysis, has been slipped over, and the whole state or activity wearing thus the appearance of spontaneity, has come to be called a sense in action, or by others an immediate intuition.

The above criticism will apply also to the system of Mackintosh, who differs from the writers just named only in his endeavor to trace the origin of this same moral sense or conscience, looking upon it as a derived and secondary sense, the result of the association and mutual modification of many attractions and aversions.

The system of Adam Smith seizes the altruistic instinct, sympathy, and endeavors to show that in judging the conduct of others we are governed by a preponderance of sympathy; and that in judging our own conduct we hypostatise the common sympathy, as that of an impartial spectator, who thus judges, and acquits or condemns us. *Conscience*, with him, then, is the feeling of sympathy, in minimum or in overplus, thus fortified by the general sympathy. The conspicuous fact that we sometimes judge an action to be right or wrong when the general sympathy is entirely the other way, shows that Smith has overlooked the true criterion, and that the system does not give a correct account of moral experiences, and, therefore, our term "conscience" cannot be legitimately applied to any such phantasmal process; nevertheless, had Smith pushed his examination somewhat deeper, and scrutinized more closely this wonderful fact of sympathy, and discovered that it implies the organic unity of the human race, and in a lower sense, but one no less real, the unity of all animal life, he might have reached an important and essential element of the ultimate and eclectic system of ethics: a sort of mediating principle between utilitarian and intuitionalist schemes.

We have already alluded to the function of conscience as given by Kant, which consists in holding up the Categorical Imperative, the Will's own legislative and judiciary norm. But if, as his critics assert, this is a form without content, and we are still left without the means of making absolutely trustworthy moral judgments, the function of *conscience* is too much narrowed, and we insist upon having the word for other and more valuable and indispensable use. All this does not ignore the important service done to moral philosophy by Kant, which consisted in giving, even in its autonomic form, a kind of objectivity to the moral idea, making it to be something more than a means to the end of individual happiness, making it an end *per se*. Thus with him it becomes the presupposition and basis of all speculation upon the supersensuous, and hence also of rational religion. With him the universal validity of the moral law became the formal principle of morality. Its material principle, the exhaustive content of the moral idea itself, he did not set forth, though hovering always on the edge of the solution. Hence the possible or seeming inconsistency in his use of the word "conscience" to which we have referred above.

Fichte endeavored to supply the material principle to the Kantian Ethic, this principle being the assertion and endeavor after absolute self-dependence, hence an end to be approached by an infinite process. But this looks like the denial of any moral organism, seems the very extreme of individualism. The conditions for a true ethic exist not, and the common instinct of men recoils from this absolutism of the individual subject, as the very contradiction of the moral idea. *Conscience* with him, then, would be the immediate feeling of harmony between the natural tendency and this tendency to absolute freedom.

The system of pure Intuitionalism, which was first in England carefully formulated by Richard Price, not illumined by Reid, but confusedly reuttered by Dugald Stewart, has reached its clearest expression in Prof. Henry Calderwood. With him "conscience" is "that power of mind by which moral law is discovered to each individual for the guidance of his conduct." . . . "In discovering to us truth it is seen to be a cognition or intellectual power. Either it does not discern truth, or if it does, it is not a form of feeling or combination of feelings or affections or emotions or desires." Thus, in discovering law, "it has authority over all other springs of activity within us." . . . "From its very nature it cannot be educated." Now this language of Calderwood, though seeming precise, yet may be thought to be otherwise, provided the correctness of our analysis in the early part of this article be admitted. At one time his words seem to make *conscience* identical with the intuition of the criterion, standard, moral idea, which we named provisionally, *x*. In asserting, however, that it has authority, which authority may be recognized, he seems to be inconsistent with his other assertion that it is not a form of feeling, for the recognition of such moral law contains within itself complacency, satisfaction. The judgment cannot escape from this transfused feeling. With this omission rectified, however, the word "conscience" would be used to indicate an acknowledged fact or experience, and such use would not be, and could not be, false.

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that it can have universal application and true validity and objectivity only under the presupposition that we are or can become perfectly acquainted with the character of the action, and also with the requirements of the norm. The system which prefers this use of the word does not furnish mankind with what they want most, an unfailing rule of action. Perhaps no system can supply this. But that one is preferable which does not leave us in a fixed and helpless state, sometimes searching after intuitions which do not come, or their phantasms which deceive us; but shows us some mode of approximation towards the perfect knowledge which still eludes us, and makes applied morality a work of progressive induction rather than of precise deduction.

This is the claim and the endeavor both of utilitarians of the altruistic kind and of the other class of intuitionalists. Not all utilitarian writers have been careful in the use of the word. Some have been quite willing to use the phrase "moral sense," meaning thereby a form of feeling, which may be called reverence for moral distinctions or for one alternative of the same, acquired from foregone experiences of utility. Sometimes the pain-giving power of conscience has been recognized, and made the prominent thing in its definition and use. Utilitarians are very little given to use the word to indicate any kind of knowledge, or any form of knowing. The discovery that certain actions in their results are pain- or pleasure-giving, and therefore that prudence counsels or warns, is not by them called "conscience." The word "obligation," which implies a *law* superimposed and made known, does not usually find place in utilitarian systems; though a form of that solution is quite possible which can consistently use both words, and in the highest sense ever claimed for them. Ordinarily, however, among this class of writers, the word "conscience" is not used to indicate the relation of an action to a superimposed law, but to mean a feeling of content or discontent with the actual as compared with some ideal or state desirable for the individual, or the community, or mankind in general, which has been set up as possible to be attained. This will be the customary use of the word in both forms of hedonism. The use of the word, then, will be correct so far as it goes. Its inadequacy still arises from the grave fault of most utilitarians in misapprehending the norm. Hence the system which relies upon its ability to trace the consequences of actions in order to discover their moral quality, finding that in the search it soon plunges into darkness, confesses that it cannot supply an adequate guide for human conduct, which must still stumble on, often in the gloom.

With Prof. Bain, conscience is a power gradually manifesting itself in the individual consciousness from observation of the government without us, parental, civil, religious. The fear of encountering pain, the desire to win complacency and kindness from those having power over us, is at length supplemented by the discovery of the young mind that the punishments and rewards of those in authority are bestowed or threatened wisely and for ends subserving the general welfare; and thus the child acquires not only a standard of comparison, but the feeling of dread or satisfaction. This intelligence, thus gradually expanding, with the accompanying feeling, is "conscience." It is evident, however, that this conscience thus formed in childhood cannot continue to meet the test of matured knowledge, unless it appears that the authority is wisely used, and does subserve the general welfare. And thus, to be logically self-consistent, this theory must merge into or be supplemented by the utilitarian, and is liable to the same criticism. However, this endeavor of Prof. Bain to show the rise and growth of the moral intelligence contains important truth. That the existence of authority external to us does afford the stimulus of the young mind to examine the moral idea within itself, to make its outlines start into light and display their ramifications; that this is the way not only that every child has been educated, but the way in which the human race has been educated, is precisely the teaching of the Jewish and Christian Scriptures, and the key to understand their progressive moral utterances.

The theory of Mr. Herbert Spencer is very subtle and very ambitious, and is woven into his general philosophy of evolution. In the early periods of the history of the human race the discovery of the beneficial effects or mischievous results of certain acts, to one's self immediately, or to others immediately, and thus to one's self mediately, generates habits of doing or avoiding such acts, of seeking or shunning opportunities of doing them. The accompanying feeling of attraction or repulsion grows stronger by use. The habit and the feeling are transmitted to the succeeding generations, acquiring minute and incessant modifications, till all memory of its origin is lost; and the man comes to think that this thing is to be done, and that to be avoided, he knows not why; so that it has become an instinct, and has the immediacy of appetite, or acts like a sense, or seems an intuition. This spontaneous proclivity or avoidance then may be called "conscience." Really it is made out to be a judgment, of the conditions for which the mind has lost all trace, till it attempts by difficult and almost hopeless thought to recover its obliterated history.

Though this theory cannot be proven, it may be made probable. It may be accepted as hypothetical history without misgivings. But it is not exhaustive, it will not account for all of our moral experience. This possible evolution may have served the same purpose exactly as Prof. Bain's "education." It has been the occasion, and has furnished the stimulus to the infant human race to look within. It has made it sure that actions are not indifferent, and caused it to betake itself to the task of introspection in order to discover what kind of actions, and what dispositions or character will meet its ultimate approval. The soul has found itself possessed of egoistic and altruistic instincts. Life requires that these shall be mediated somehow, reconciled, and harmonized. This can only be done by comparison with a represented state or condition, carried as far into the future as the intelligence will allow, and which owes its birth to imagination: that is, to the soul's self, kindled to the fullest intensity of its power, and transfusing itself into that ideal state which can alone satisfy all the requirements of being, intellectual, physical, ethical, and, in the harmony of all, æsthetical.

Even under this derivative theory of morality, then, the word "conscience" can be legitimately used to indicate correspondence or contradiction of an action

with the preconceived norm, the imagined ideal state. But, alas, the ideal state that hovers before Mr. Spencer's vision, of improved and harmonized instincts, is impossible in this world of tempests and agonies. Hence the endeavor to contemplate something so shadowy, to which the onward march of necessity, of molecular action, is carrying us, leaves us in a pessimistic frame of mind; and we cannot help thinking that it is the grimmest of self-mockeries to think that we are free, when we are not, and to take any pains in the matter.

While the one class of intuitionalists who hold the idea of *good* to be simple show a preference to use the word "conscience" to indicate the soul's possession of a norm, and the inevitable approbation or condemnation of an action resulting from the comparison; the other class, who hold *good* to be a complex idea, giving various definitions (Wollaston, Clark, Montesquieu, Malebranche, Wolf, Jouffroy, *et al.*) show a disposition to use it to mean the process of comparison of the action with the norm, where the approbation or condemnation, though sure, and having authority, yet is not unerring, but may be susceptible of all degrees, and various kinds of improvement. It is not necessary to criticise the various attempts at explanation of the moral idea given by these authors; the definition of conscience we have given will hold good for any or all of them.

An ethical system is possible and to be desired which shall bring together into a consistent whole the ineffaceable aspect of truth, the imperishable element in each of these systems we have brought up for brief inspection, and which has given to it its vitality. It may seem strange that the human intellect has not succeeded yet in doing this, though haunted by a sense of its possibility. Were the task accomplished, it would still be a question whether to retain the use of the word "conscience," or to reject it with Rothe; and, if retaining it, to what mode of consciousness strictly, consistently, and uniformly to apply it. Perhaps the safest and wisest course is to use the word to indicate the intelligence displayed in comparing an action with an ideal standard, together with the accompanying feeling, of complacency or its opposite, elicited by the comparison. This ideal exists. The endeavor to account for its origin and development has given rise to such schemes as those of Adam Smith, and Bain, and Spencer. The endeavor to account for the immediacy of its apprehension has given rise to pure intuitionalism, and the notion of a moral sense. The endeavor to analyze the ideal itself gives rise to utilitarianism. The success of this endeavor has not been recognized, the analysis is thought to be superficial and unsatisfactory, probably because for the most part utilitarianism has been fettered or blinded by what is called the philosophy of empiricism.

The idea of the *good*, the attitude of the reason towards which is expressed by the word *obligation*, still awaits analysis and reconciliation with the ultimate philosophy, with the Ideal Realism which is gradually constructing itself out of the imperishable masses or fragments of truth contained in previous systems, and all the labors of the past will be found to have cleared the way and simplified the problem, bringing more and more distinctly before us for intensest scrutiny the unique experience, called moral, which no philosophy has been able to think away. Whatever be the result of this scrutiny, that complex, far-reaching, and many-sided experience will, either in its totality or in one of its essential elements, continue to be called by the name—"conscience."

IV. To know the exact sense in which this word, or its equivalent, has been used by every notable philosopher, from Socrates and his predecessors downward, it would be necessary to reproduce their thought. We can only mention a few representative names to indicate such actual variations of thought as have corresponding uses of the word.

In Socrates we find a number of moral rules, with no attempt to exhibit their unity. Morality consists in subordinating the sensual to the rational, and *conscience* would be the faculty detecting the degree of subordination. His ideal standard is that of a well-ordered civil state, and is lacking in universalistic conceptions. With Plato, virtue means both wisdom and strength, and shows itself in these, and in manliness, temperance, and justness. It requires for its field, however, the community life, the state. Only as a citizen, and as contributing to the perfection of this organized machine, can the individual realize true morality. Thus the lower classes cannot be fully developed. They exist only for those above them. Plato's system does not do justice to the category of the individual, and his ethic is devoid of universalistic conceptions, and what we call moral obligation is not comprised in it. With him, conscience must mean the faculty detecting correspondence of action and character with his definition of true wisdom and virtue.

The idea of the state, of the moral community life, appears again in Aristotle, and is still more profoundly treated. There is no recognition of humanity as a moral whole. Virtue is still to be had by the free citizen alone. There is, however, in Aristotle a clearer recognition of moral freedom than in Socrates or Plato; hence, that knowledge and practice do not always go together. The facts of dereliction, accusation, and condemnation would, therefore, receive greater emphasis, and this function of conscience be more clearly seen, and somewhat more dwelt upon. With the Greeks in general, however, even in the most ideal systems, morality is the product of a wise and rational calculation, thus a form of utilitarianism, and something quite other than the Kantian ethics. Very little stress is laid upon the judiciary function of conscience, for the reason that the sense of sin, of moral discordance was not deep, and hence the feelings arising therefrom, though existing, and not entirely extinguishable, yet were weak, and not distressingly painful.

In Epicurism, with its tendency to the external, to an ideal of joyous voluptuousness, and in Stoicism, with its tendency inward, its pride and intense self-satisfaction, its ideal of spiritual strength, of course, *conscience* would vary in its signification accordingly; and a man's failure to reach the one end or the other, would inspire in the one way of thinking *pity*, in the other *contempt;* and the work of conscience would be narrowed down to this. Both systems are still only forms of selfishness.

All the functions of conscience, and all the elements of any possible moral experience, short of the Christian, make their appearance in the ethics of Judaism. Here the element of feeling receives great intensification. While, to be sure, the standard or criterion appears as a positive, objective, historically revealed law, such as parents set forth to their children, and is gradually adapted to their advancing intelligence, still there is taken for granted all the while its coincidence with the

inward norm, and no contradiction between the same is thought possible. Strictly and scientifically speaking, conduct and character are *moral*, only as they are compared with the inner norm. Their relation to the outwardly propounded law is more correctly termed *religious;* as coming under the same head with ceremonial observances prescribed by positive enactments, they are part of a *cultus;* which, however, may be a means to an end properly moral. Conscience, then, in Jewish ethics, may and does usually mean religious conscience, the intelligence contemplating the relation of the action to the external law.

In Christianity the absolute coalescence of morality and religion is proclaimed; which, however, does not mean that the first exhausts the significance of the second, but that it finds its ground in it. The New Testament writings contain an ethic so profound that all the labors of Christian moral philosophers have been needed for its display and elucidation, and the vindication of its absolute rationality. If the result of human labor in pure ethical science shall succeed in exhibiting the identity of the ultimate moral theory or solution, comprising all its facts and implications, with that which underlies the Christian consciousness, it will be proof that the highest achievements of human intellect were by Christianity anticipated, and thus men be led to conclude afresh, and on profounder grounds than ever, that it is a revelation indeed.

The labors of Bishop Butler in moral science deserve high commendation. Under other names his investigation goes to establish, by careful observation, the "predisposition to good" and the "bias to evil" in human nature,—the conclusion reached by Kant,—and his definition of "conscience" is coincident with that we have approved above, "a principle of reflection in men, whereby they distinguish between, approve and disapprove their own actions," which alone should cause him to be reckoned among rational moral philosophers, and not among sentimentalists; for his use of the phrase, "a principle of reflection," implies a rational standard of comparison. He did not, however, set himself to analyze the moral idea, nor to investigate its origin, or the *modus* of its development.

It is hard to find a system of ethics in Hegel. Freedom and necessity are, indeed, different aspects of a concrete whole, but with him self-determination is so thought as to appear rather self-necessitation than what we ordinarily call *freedom;* whereas most moral philosophers hold to the naïve sense of the latter word as a primary of thought, and therefore not to be abandoned. Yet, in holding that in the family and the state human personality rises into higher definitions, we have in Hegel the material principle of altruistic morality implied, though it does not clearly appear that he took the further step of regarding the Church, the true ethical commonwealth, whose very idea is universality, as alone affording the ultimate definition and reach of personality. Hegel seems to use the word "conscience" as the faculty detecting contradiction to the principle of abstract right, which is, the assertion of one's own personality and respect to the personality of others; hence shows itself at the appearance of the Bad; a use easily adjusted to the adopted definition.

Cousin and Jouffroy use the word in the sense we have given.

McCosh treats the subject of Conscience with great vigor, using the word, however, in a larger sense than we have indicated as preferable, making its function not only to reveal the moral idea as law, but also to judge of actions as conformed to it, and laying great stress on the emotions which may accompany it, which may become something powerful and fearful.

Compte bases his ethical theory upon the idea of the family, the true social unit, and it is not a theory of personal conduct according to which each individual is a separate factor. But as actions originate with the individual, there must be a law of such personal action. We find in Compte much morality, but no moral philosophy. With him, however, conscience would mean the agreement or disagreement of actions with the rationalized social sentiment. Thus, in spite of his denial of "introspection," and disclaimer of the need of a psychology, the final reference is to the acquiescence in the æsthetic demand, for which this rationalized social sentiment is only another name. Thus the clear truth peers up and shows its face under the cloudy verbiage of any or all systems. (J. S. K.)

CONSCIENCE, HENDRIK, (1812–1883), a Belgian novelist and poet, born at Antwerp, Dec. 3, 1812. His father was a Frenchman, who, after long employment in naval affairs under the First Empire, had removed to Antwerp, where he became a speculator or trader in the construction and purchase of ships. Conscience received very little care and education in early life, but was a great reader, and became an instructor at the age of seventeen. Immediately after the Belgian revolution in 1830 he enlisted in the army, and was soon known as the soldier-poet, his patriotic songs, written in French, being on every tongue. He rose to the grade of sergeant-major, and was honorably discharged in 1836. His father, incited by an unkind stepmother, treated him very harshly, and, thus estranged from his family, it was with difficulty that he could gain his bread. He was obliged to take whatever work he could get, and was at different times and in rapid succession gardener's boy, register of an art-academy, employé in the department of archives—anything for a livelihood. In 1845 fortune seemed to smile on him; he was appointed assistant professor in the University of Ghent and tutor to the children of King Leopold in the Flemish language and literature. A little later he was commissioner of the arrondissement of Courtrai. Incident to the Belgian revolution there had been a growing desire among scholars to restore or reconstitute a Belgian literature, which, in union with the Catholic Church, should be opposed to French ideas and the *libre-penseurs* of the eighteenth century. Conscience devoted himself to this service, and saw in it the restoration of the ancient glories of his country. His first important work, published at Ghent in 1837, was *The Year of Miracles* ("In het wonder jaer"). It presents in a spirited series pictures of the former days when Spanish tyranny was confronted and resisted by Flemish daring and love of liberty. Somewhat crude in its handling as a first effort, it was well received by the public, but increased the anger of his father, who did not wish him to pursue a literary career. The estrangement was now complete, and he was in very straitened circumstances when, through the agency of his friend Wappers, a painter, he received a small grant from the king which enabled him to continue his literary work. In the same year (1837) he published *Phantasia*, a volume containing Flemish poems and legends. In 1838 appeared *The Lion of Flanders* ("Leuw van Vlandern"), or the history of that Robert de Bethune who resisted Philippe le Bel of France and succeeded in establishing his power as count of Flanders. Having thus laid the foundation

of Flemish claims in history, Conscience employed his pen in portraying more modern times. His descriptive novels are very numerous; between 1839 and 1845 he wrote *Evening Hours*, *The Executioner's Child*, *The New Niobe*, *The Conscript*, and *The Poor Gentleman*. In 1845 appeared his *History of Belgium*, written from the ancient chronicles. In 1846 he wrote *Hugo de Craenhoven*, *Quintin Matsys*, and *Some Pages from the Book of Nature*; in 1849, *Jacques de Artevelde*; in 1851, *Rosa, the Blind Girl*. As all these are in the Flemish language, and are considered as protests against the French, while they were at once translated into English, German, Danish, and Italian, it was not till very lately that they have appeared in French versions. In 1858 his *Mémoires* were published in the *Revue contemporaine*. Among his latest works were *The Road to Fortune* (1870), *The Lost Glove* (1872), *The Pale Young Woman* (1872), *The Blue House* (1874), *The Substitute* (1875). Not only in his avowed histories, but in many of his novels, he was an historian, so that whoever would read the history of Flanders must have recourse, in part at least, to the varied and patriotic works of Henri Conscience. He died at Paris, Sept. 11, 1883. (H. C.)

CONSCIOUSNESS is the name of an inward state and of an inward activity. It is the condition of all other inward states and activities, and is inseparable from them except in abstraction. There are no feelings or perceptions which are not conscious feelings and perceptions. On the contrary, it is only in virtue of their possessing the attribute of consciousness that they become real feelings and perceptions. Consciousness, as a state, is thus the common attribute of all particular internal states, but is to be completely identified with none of them. On the other hand, there is no consciousness except in and through particular internal states. Consciousness is therefore the common state of all internal states. It is with reference to them, as the one in the many. Such a relation is, and can only be, ideal and organic. And, like all organic relations, it can *exist* in the form of a state only as the result of a sustained process, by which its *existence* is *actively maintained*.

Considered, now, purely as a state, and without reference to the active process on which the state depends, consciousness is absolutely *sui generis*, and hence incapable of being defined. It "coexists invariably" (in the language of Prof. Wundt) with physiological processes and states, on which it is functionally dependent. In the lower animals it exists in germinal and implicit, rather than in explicit and developed, form. Their internal states are predominantly particular, immediate, and objective. In other words, their psychical life is pre-eminently absorbed in the sensations of the immediate present. The "common state of all states"—to repeat the phrase by which we have described the state of consciousness—is mostly lost in the shadow of the immediately passing and more vivid particular states. But its real, implicit presence is indicated by facts which prove that brutes have the power of memory and some power of reflection. For memory and reflection are impossible except where various internal states are held together by a common bond, such as the state of consciousness.

What is thus true of brute consciousness is also true concerning the lowest and earliest phases of human consciousness. But with increasing maturity and reflection consciousness acquires a definiteness and a degree of development whereby it is revealed in a character corresponding more exactly to the etymological meaning of the word itself. The word means co-knowledge. It denotes a knowledge that accompanies another knowledge, and has this latter, as well as itself, for its object. I may, for example, be thoroughly absorbed in the contemplation or investigation of any object, and then all my thoughts and perceptions will be related to and suggested by the object. The conscious state will still be present in form, but reduced to a minimum in intensity. But now, by a distinct act of reflection, I may become expressly aware that *I* am having the aforesaid thoughts and reflections, that they are all *my* mental possessions, that they all cohere or are associated in *one* field of living mental vision which is exclusively my own. The express form and nature of my knowledge will now be *conscious*. It will be a knowledge whose object is the thoughts and perceptions which just before engaged all my attention, together with the knowledge of their being livingly united in one mind or "consciousness," which is exclusively my own. This act of knowledge is an *act* of consciousness. This act is at once reflexive and objective. Consciousness as a *state* represents, as above indicated, the aspect of unity in the multiplicity of particular internal states. In the *act* of consciousness this unity, in the form of a cognitive activity, is aware both of itself (reflexively) and (objectively) of the particular states or acts which are comprehended within it. It is at once self-consciousness, or subjective consciousness, and objective consciousness.

The theory of consciousness is of decisive importance for the theory of knowledge, and so for the theory of Being (ontology, the science of the real object of knowledge). In this relation the conception and the theory of consciousness are especially a modern growth. The tendency of nominalistic sensationalism—notably in Great Britain—has been to regard consciousness exclusively as a state, or rather as only a name for the indefinite sum-total of all individual internal states. Thus viewed, it is like a moving panorama, which reveals itself and nothing more. The real object of knowledge (especially the "external world") and the real subject of knowledge (the Ego or Self, or knowing mind) are in this way beyond knowledge, and the resulting philosophical doctrine is Subjective or Sceptical Idealism, or Phenomenalism. Kant demonstrated that the state of consciousness is essentially dependent on a synthetic activity, whose highest form and indispensable pre-condition is explicit or implicit self-consciousness. The successors of Kant found in the triadic law of the process of self-consciousness—whose terms are Subject, Object, and the living organic Synthesis of Subject and Object—the law of all intelligence and of all the objects of intelligence.

The Greek etymological equivalent for consciousness (*συνείδησις*) occurs but rarely, and only in works belonging to the later phases of Greek philosophy. Contributions of no slight consequence were nevertheless made by the ancients to the comprehension of the subject under other names. (Cf., for example, H. Siebeck, *Der Begriff des Bewusstseins in der alten Philosophie*, in the *Zeitschrift für Philosophie*, vol. lxxx., No. 2, 1882.) The Latin word *conscientia* was in far more prevalent use, but especially in the sense of *conscience*, or moral self-knowledge.

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others. See also Mansel's Bampton Lectures, *Limits of Religious Thought* (5th ed. 1868). (G. S. M.)

CONSHOHOCKEN, a borough of Montgomery co., Pa., is on the east bank of the Schuylkill River, 13 miles N. W. of Philadelphia. Two railroads pass through the town: the Norristown branch of the Philadelphia and Reading; the Schuylkill Valley branch of the Pennsylvania Railroad; the former has a connecting branch to Plymouth and Abington. The borough has 2 banks (1 national), a weekly newspaper, 6 churches, good public-schools, a free library, an engine-house with a steam fire-engine, a public-hall, and market-house. It has water-works and gas-works, 4 rolling-mills, cotton-mills, print-works, boiler- and car-shops, iron-pipe foundries, and a planing-mill. Here Lafayette, in May, 1778, crossed the river and escaped from the British army, who had endeavored to surprise his camp at Barren Hill. A bridge still bearing the name of Mattson's Ford connects this borough with West Conshohocken, on the main line of the Philadelphia and Reading Railroad. Here there are 2 blast-furnaces, a woollen-mill and a worsted-mill, 1 church, a public-school and a free library. The post-office is named Mingo. Population of Conshohocken in 1890, 5469.

CONSIDÉRANT, Victor, a French Socialist, born at Salins, Jura, Oct. 12, 1808. He studied at Paris in the Polytechnic school, entered the army as an engineer officer, but resigned his commission in 1831. He took part in the socialistic experiment of 1832 at Condé-sur-Végre, and was associated with Fourier as editor of *La Phalanstère*. In 1834 Considérant published *La destinée sociale*, one of the ablest socialistic works ever written. When Fourier died, in 1837, Considérant became the chief of the Fourierites; was editor of *La Phalange* (1836–43), and of a daily paper, *La Démocratie Pacifique* (1843–50). He was chosen to the Republican constituent assembly of 1848 as representative for Loiret. In 1849 he was returned as member for Paris for the Legislative corps, but on account of certain indiscreet acts he was soon compelled to retire from the country. He went to Belgium, and thence, in 1853, to Texas, where he afterwards organized the unsuccessful socialistic colony of La Réunion. He was naturalized and stayed in Texas till 1869. Among his works are a *Manifeste de l'école sociétaire* (1841); *Exposition abrégée du système phalanstérien* (1841); *Théorie de l'éducation naturelle* (1845); *Principes du socialisme* (1847); *Théorie du droit de Propriété et du droit au Travail* (1848); *L'apocalypse, ou la prochaine rénovation démocratique* (1849); *Mexique: quatre lettres au maréchal Bazaine* (1868).

CONSIDERATION, in law, the motive or matter of inducement to a contract. It may be either an advantage or benefit inuring to the promisor, or a loss or privation sustained by the promisee at the request of the promisor.

In the Roman law a contract without consideration was termed a nude pact, and was not enforceable unless made with proper words and formalities—*pactum verbis prescriptis vestitum*. In such case a nude pact was allowed to be enforced upon the ground that the circumstances disclosed a deliberation, caution, and fulness of assent on the part of the promisor in entering into the contract which prohibited him from subsequently withdrawing therefrom. By the rules of the common law, a somewhat similar effect is given to contracts under seal. The seal in such cases is said to import a consideration, and the promisor therefore can in no case escape liability. By the rules of the law merchant, bills of exchange, checks, and promissory notes also import *primâ facie* the existence of a consideration. But this presumption is capable of being rebutted.

At common law, simple contracts cannot be enforced without consideration, and the burden of proving the consideration lies on the party seeking to enforce the contract.

Considerations are either valuable or good. A valuable consideration is marriage, money, or money's worth. A good consideration is blood-relationship. As a rule, a contract must, in order to be enforceable, be based on a valuable consideration.

Valuable considerations embrace, as has been said, anything which is money's worth. Forbearance, therefore, to sue, or the prevention of threatened litigation, or the waiver of any legal or equitable right, is held to constitute a valuable consideration.

Moral considerations are such as consist of an obligation to do or not to do some particular thing which is binding in morals though not in law. Much question has been raised as to whether or not a moral consideration is sufficient to support a contract. In England it has been decided that it is not, but a contrary conclusion has been reached in many of the United States.

Considerations are also either executory or executed. An executory consideration is one which is to be performed in the future. An executed consideration is one which has been performed at the time of making the promise. An executed consideration is not sufficient to support a contract founded thereon.

Considerations are also legal or illegal—*i. e.*, they are either in accordance with or opposed to the policy of the law. A contract founded upon an illegal consideration cannot be enforced. *Ex turpi contractu non oritur actio.*

Concurrent considerations are those which arise at the same time, as if A promise B that if B will go to Rome, A will go to London. In this case either party, having performed his part of the contract, is at liberty to enforce performance on the part of the other. In order, however, that concurrent considerations should constitute a valid and binding contract, they must be both legal and possible. (L. L., JR.)

CONSPIRACY, under the American law, is a combination of two or more persons, by concerted action, to accomplish some criminal or unlawful purpose, or to accomplish some purpose not in itself criminal or unlawful, by criminal or unlawful means. This offence consists not in the accomplishment of any unlawful purpose, nor in any one act moving towards that purpose, but in the actual concert and agreement of two or more persons to effect the unlawful thing so concerted or agreed upon. Mere concert in itself is not a crime, for associations to prosecute a felon have been held to be lawful; but it is the object or purpose of the concerting that make the offence. Where the object or intent if carried into effect would be a wrong, then concert is indictable, as an act in itself tending to produce it; as, for instance, to support a cause, in itself just, by false testimony. A combination to do a criminal act is indictable; also an agreement or confederation to do a lawful act by unlawful means; because, in the first instance named, the act being in itself criminal, a conspiracy to do it must in the very nature of things be also criminal, whilst in the second instance, the means being unlawful, it matters not

See Vol. VI. p. 261 Am. ed. (p. 293 Edin. ed.)

what may be the act to be done. The combination is criminal whenever the act to be done has a necessary tendency to prejudice the public or to oppress individuals, by unjustly subjecting them to the power of the confederates, and giving effect to their purposes, whether of extortion or mischief. By the law all are held responsible who combine or confederate and agree to accomplish such illegal purpose. As the gist of a conspiracy is the unlawful confederacy to do an unlawful act, or a legal act for an unlawful purpose, the offence is therefore complete when the confederacy is made.

Under the United States laws the following are the things a concerting to do which made between two or more persons constitutes the offence of conspiracy: (1) An agreement to overthrow the government of, or levy war against, the United States; to overthrow, put down, or destroy by force, or oppose the authority thereof; by force to prevent, hinder, or delay the execution of any law of the United States, or by force to seize, take, or possess any property of the United States, contrary to the authority thereof. (2) To deter a party or witness from attending or testifying in a court of the United States, or to injure one on account, or to influence a verdict or indictment by grand or petit jury, and to impede the due course of justice with intent to destroy equal protection of laws. (3) To hinder or prevent any person from voting or qualifying to vote at any election, or to injure, oppress, or intimidate any citizen in the full exercise or enjoyment of the right or privilege secured by the Constitution or laws of the United States. (4) To hinder by force or intimidation any person from occupying or holding office under the United States, or to injure such officer on account. (5) To induce any officer of the United States to leave any State, or to injure such officer on account. (6) To defraud the United States by obtaining approval of any false claim against the same. (7) To cast away any vessel with intent to defraud the underwriters. The act of Congress upon the subject of conspiring to cast away vessels with intent to defraud underwriters presented the following punishment to be inflicted upon those convicted for the offence—a fine of $10,000 and an imprisonment and confinement at labor not exceeding ten years. Under this act it has been held that the combination with the intent consummates the offence, though neither the vessel nor cargo be injured. It has, however, been further held that in such cases the intent to injure the underwriters is an essential ingredient of the crime, and without an averment of such intention no offence is described in violation of the act of Congress.

The things a concerting to do which constitute the offence of conspiracy in the several States of the United States are as follows: To seduce and carry off a female under the age of 16 years is indictable under the laws of the State of Virginia. In South Carolina to combine to injure a person because of political opinions is an indictable offence; also a combination for the purpose only of getting possession of lands by means of an extorted deed in favor of the legal owner. In Illinois to agree to obtain goods under false pretences; to combine to seduce a female, whether the means resorted to are lawful or not; also to procure criminal process for improper purposes. In North Carolina to combine to intoxicate a person for the purpose of cheating him at cards. In this State the offence of conspiracy to cheat and defraud is not embraced within the exceptions of the act limiting the time within which prosecutions for misdemeanors shall commence. In Maine it is conspiracy to combine to do injury to the person of an individual, or to do an unlawful act injurious to the administration of justice. By the law of the State of Massachusetts it is conspiracy to manufacture spurious indigo with intent to sell at auction as good, to defraud whoever may be defrauded without having any particular person in view; to commit a felony or misdemeanor or any other act that is criminal; to defraud individuals or corporations of property; also to charge any person with a crime, though there be no intention to procure an indictment or legal process against him. In California to combine to burn buildings with the intent to defraud the insurers is a conspiracy. The laws of Michigan make it a conspiracy to combine to defraud an individual of real or personal property. In Texas it has been held that, where a person and others started on a fox-chase, but subsequently went to chasing cattle which were killed, the case came within the rule of law that, when a number of persons met together for a different purpose and afterwards join to execute one common purpose to the injury of the property of a third party, it is a conspiracy. In Maryland it is conspiracy to combine to defraud a third person, accomplished by means of an act that would not amount to an indictable cheat if done by an individual; also to combine to commit a felony or any act that is criminal. In New Jersey a combination to defraud an incorporated bank of issue so that the securities held by the public are impaired, is an offence of so public a nature that it is indictable at common law; to maliciously indict another; to combine to defraud others of property; moving, by false testimony, an act injurious to public health, or by making war on other States of the Union. The common law conspiracy in this State is not abolished by statute, but such a conspiracy as was indictable before the statute, at common law, is so still. In New York all who accede to a conspiracy are guilty, for they commit the offence, when they become a party to it. By the laws of this State the offences are as follows:—to agree to commit a felony or any other criminal act; to defraud individuals or corporations of property; to injure others by obstructing public justice by fabricating or suppressing evidence; to combine for the purpose of destroying a will with a view of cheating devisees; to falsely and maliciously indict a person; to falsely move or maintain a suit. By the laws of the State of Pennsylvania it is enacted that if two or more persons shall conspire or agree, falsely and maliciously, to charge or indict any other person or cause or procure him to be charged or indicted in any court of criminal jurisdiction, the person or persons so offending shall be guilty of a misdemeanor, and on conviction be sentenced to pay a fine not exceeding $1000 and undergo an imprisonment either at labor or in separate or solitary confinement not exceeding 3 years; to petition against the appointment of a school-teacher if instigated by malice; to make real sales and pretended purchases of stock in order to induce brokers to advance sums of money on such purchases, and then defraud them, is indictable as a conspiracy; to combine to destroy a will in order to cheat devisees. Conspiracy in this State is not the subject of a criminal action unless some act be done to give effect to the purpose of the conspirators, either by extortion or mischief. It makes no difference at what time any person comes into a conspiracy: every one who enters into the common design is in law a party to every act

which had been previously done by any of the others in pursuance of it. All the States of the United States, independent of the statutory provisions for the offence of criminal conspiracy, provide an adequate civil remedy for the offence, which partakes of the nature of damages for the injury which the party has sustained, or been subjected to, by reason of the acts of the conspirators. It seems to be the universal opinion, however, from the authorities, that the damages claimed in the civil courts must be of an actual nature, as the foundation of the civil action is the damage done to the plaintiff, and not the conspiracy.

A very important element now enters into the consideration of the subject of conspiracy; *i. e.*, the relationship existing between the employer and the employés. That relationship has at times, instead of being reciprocal in its action, assumed the form of persecution against the weaker—the employés—with the avowed purpose of reducing and holding them in a state of absolute subjection. The establishment of large industries naturally commends them to the special protection of the laws, against any undue encroachment on the part of labor that might tend to retard or injure the growth of their commercial importance, and so, also, does even-handed justice demand a like protection for labor against the oppression of capital, on the principle that the law knows no distinction, but, treating all alike, protects and punishes without discrimination. Yet the American legislatures, forgetful of this principle, have lent their powerful aid to the side of the employer, and passed oppressive laws for the government of labor that fully justified the employés in combining for their own protection, making such rules for their own government as the emergencies of the moment required, and for the regulation of and defining the prices at which they shall work. With the laws thus opposed to them, declaring their protective combinations to be conspiracies, and punishable as such, it would seem that labor could do but little for itself; yet their efforts, combinations, and strikes have resulted to their advantage by compelling the employers to ameliorate the condition of the employé, by either acceding to their demands or effecting such compromises as were acceptable to them, which, coupled with a public sympathy that had been aroused by the intrepid perseverance on the part of labor to better its condition, led the legislatures of several of the great States to modify the laws, so that the condition of the laboring classes should be rendered better than that of serfs, and afforded them substantial protection against the oppressive tyranny of overgrown capital. Many of the States, and some whose claim to enlightenment would have promised better acts, have still upon their statute books these shameful laws; notably, in Massachusetts, it is enacted that a combination of journeymen and workmen of any trade or handicraft to raise their wages, and compel journeymen or master workmen in the same trade to conform to rules established by the combiners for the purpose of regulating the prices of labor, and to carry such rules into effect by overt acts, is a conspiracy, and punishable.

The State of Texas has partly legislated in favor of the workman, and proscribes only that action which in itself is injurious. There, a combination among workmen of a particular trade to prevent other workmen from laboring at a less rate of wages than that prescribed by the union is declared as contrary to public policy, and may amount to a conspiracy. But an agreement among the workmen that they will not themselves work for less than a stipulated price, confined in its operation to those who agreed to it, and enforced only as a bylaw of an association, is not contrary to law. Such associations have a right to make such by-law, and impose a penalty for violating it. In New Jersey a combination of workmen to agree to quit their employer in a body unless certain other workmen are dismissed, and to notify the employer of such agreement, is a conspiracy; also to advise others and encourage them into any combination for or against leaving or entering the employment of other persons.

The States of Pennsylvania and New York take the lead in entire protection of the workmen in their rights, and view them with as much concern and consideration as the employers. In Pennsylvania, by the act of June 14, 1872, Trades Unions are made lawful; the act provides that it shall be lawful for laborers, workmen, or journeymen, acting either as individuals or as members of any club, society, or association, to refuse to work or labor for any person or persons, whenever in his, her, or their opinion the wages paid are insufficient, or the treatment of such laborers, journeymen, or workmen by the employers is brutal or offensive, or the continued labor of such laborers, journeymen, or workmen would be contrary to the rules, regulations, or by-laws of any club, society, or organization to which he, she, or they belong, without subjecting them in so refusing to work or labor to prosecution or indictment for conspiracy under the criminal laws of the State; provided that the rules of such society shall not conflict with the constitution of the State, also that the act shall not prevent the prosecution and punishment under existing laws. This act was supplemented by the act of March 22, 1877, which in order to provide for the better protection of passengers upon railroads, and insure the prompt transportation and delivering of freight, enacts, that in case of strikes by locomotive engineers and railroad employés, and the abandonment by them of their engines and trains at points other than their schedule destinations, endangering the safety of passengers and subjecting shippers of freight to great inconvenience, delay, and loss, it shall be a misdemeanor for any engineer or other employé to abandon engines and trains at points other than their destination, with a view to incite others to strike, or to refuse to give aid in the movement of cars of other companies, or to interfere with other employés, or to obstruct tracks or injure property of the company, and upon conviction punishes with fine and imprisonment. In New York, by the act of 1870, Labor Unions are made lawful; also the peaceful and orderly combinations in any trade or profession to secure an advance in rates of wages or compensation, or maintenance of such; but combination of workmen to raise their wages by conspiring to compel journeymen to conform to rules established by the conspirators for the purpose of regulating the price of labor and to carry such rules into effect by overt acts, are indictable, and not within the scope of the act. Several attempts have been made to do away with the operation of this act, by the enactment of others tending against the workmen, that were simply outrageous, and had they passed would have reduced them to a state of absolute serfdom; but happily they were choked ere they came to blossom, and the fair name of the State saved the indelible blot of having such disgraceful laws on its statute books.

This equitable spirit is gradually spreading into the other States, and the rights of the laboring classes are

receiving that proper consideration which in the end will redound to their advantage, by securing for them that protection which the importance of their position as the great mass of the people demands. (F. H.)

CONSTABLE. Blackstone, in his very inadequate account of the office of constable, says: "Considering what manner of men are for the most part put into these offices, it is perhaps very well that they are generally kept in ignorance of the extent of their powers." This observation may help to account for the general ignorance and disrepute into which this ancient and once honorable office has fallen. The time was when the best men in an English parish held in rotation the office of constable. He was once the head man of his village community. The constable and four chief inhabitants of a parish constituted its board of local government. They represented the parish or the township in the courts of the hundred and of the shire. The constable was elected by the local community, but he was regarded as the connecting link between the community and the state. He was responsible before all men for the keeping of the king's peace. He could call upon any or all of his fellow-townsmen to aid him in the pursuit of criminals or in the execution of the law. He carried out the mandates of the higher courts and of the parish meetings, over which he once presided. He assessed taxes and collected them. He viewed or kept the parish armor, raised the local quota of troops, and led it to muster or to the king's host.

See Vol. VI. p. 263 Am. ed. (p. 294 Edin. ed.).

The duties of an English parish constable in the early part of the sixteenth century, when the older American colonies were founded, have been abridged as follows from an old warrant issued in 1632 to the constables of the parish of Wendover, county of Buckingham, and brought over to Dorchester, Massachusetts, by one of its first settlers. The petty constables in every parish, town, and hamlet were to report the names of all Popish recusants and of all persons not ordinarily attending church. They were to certify what felonies or robberies had been committed, whether hue-and-cry had been made and watches kept. They were to state what vagrants had been arrested and who had been sent to the house of correction; to inquire what cottages had been erected contrary to the statute of Elizabeth; how many taverns, inns, and ale-houses were in the parish, whether licensed or unlicensed; who had been drunk since the last assize; who had been ingrossers, forestallers, regrators, or malsters; what servants had been put out to service, and what unmarried persons live out of service, what bridges or highways were in decay; what provision the parish had for setting the poor to work; what apprentices had been bound out by the justice of the peace; what bastards had been born; what riots committed and how punished. All these points, and many more, were to be reported by the petty constable of the parish to the high constable of the hundred.

The constabulary law of the English colonies in America is well illustrated by the following enumeration of duties, which has been abridged from scattered references in the early statutes of Massachusetts. Constables had power to whip and punish; to speed away all hues-and-cries; to convey vagrants or offenders from constable to constable; to apprehend, with or without warrant, all intoxicated persons, profane swearers, vagrants, and night-walkers; to search for such persons in suspected places; to command the services of any one to assist in making arrest; to carry a black staff in execution of his office; to take notice of common coasters, unprofitable fowlers, idlers, and tobacco-takers, and of such as harbored young people, children, servants, apprentices, students, or scholars, without hastening them to their employments; to aid custom house officers in their search for wines; to levy all fines and collect all town rates; to clear accounts with the county treasurer; to register all lost goods and stray animals, and to cry them at town-meeting or on lecture day; to present the names of all persons refusing to watch and ward; to arrest and commit any inhabitant or stranger behaving suspiciously after ten o'clock at night; to provide and maintain the standard weights and measures for the town; to warn inhabitants of town-meeting; to make returns to the general court of the names of representatives; to warn jurymen; to summon coroners; to notify town authorities when husbands were living apart from their wives; to inform the court of all newcomers; to pursue runaway servants and, if necessary, to press men, boats, and horses into such service and bring back such runaways, if need be, by force of arms. Finally, to refuse the office of constable made one liable to a penalty of five pounds.

Such were the leading features of old English constabulary duty as it was instituted in the older colonies in America. Everywhere self-government was established in old English ways, in towns or parishes, in counties or in hundreds; and everywhere appeared the constable with his tip-staff and ancient functions of office. The constable and the local assembly are the very germs of American institutional life. It is a principle of the common law of England that wherever there is a constable established there *ipso facto* exists a parish or a township, *i. e.*, a locally organized community. Historically and legally considered, the constable is the organic power by which the community is brought into relations with the state, whether for raising revenue or troops, or for keeping the public peace, or for executing the law. Wherever there is an appointed constable, there the common law reigns in the person of the local representative. The modern constable may have fallen in some communities from his ancient high estate as local embodiment of the majesty of the law, but even in the most tranquil communities there often survive traditions of ancient constabulary power. One of the most remarkable features of this power, which in some States has been handed down to our own times, is the authority of the local constable to speed away all "hues-and-cries," and to pursue, on foot and if need be by horse, a thief, robber, or murderer, or any violator of the public peace. This authority connects modern communities and their elaborate police systems with old English parish usages, and with the most primitive methods of executing justice. A parish constable could let loose an entire village by his word of command, and the offender or outlaw could be pursued from tithing to tithing and from hundred to hundred until the whole shire was aroused. In this ancient office of petty constable there still lurks a latent power which, in times of sudden emergency, such as a local riot or conflagration, modern towns and cities sometimes find it convenient to revive.

For a more detailed trea nt of "constable" and for its histor *Hopkins' University Studies* in *ical Science*, Vol. I., No. 4, on *America*, and No. 8, *Norman C*

CONSTITUTION OF THE UNITED STATES.

Although the suggestion, the adoption, and the inauguration of the Constitution of the United States date respectively from the years 1787, 1788, and 1789, it is essential, for many reasons, to begin by describing the conditions out of which the Constitution grew. In doing so, it will not be necessary to go into minute details of the events which preceded it.

The beginning of the fifteen years (1760–75) of peaceable struggle between Great Britain and her colonies on the Atlantic coast of North America, on the question of government without representation, found the colonies joined, but hardly united. Originally separated not simply by distinct organization, but by long stretches of wilderness filled with savage enemies, they had by degrees grown together, and had even come to have common interests and to take common action. The French and Indian War, in which all the colonies joined with the consciousness that they were struggling for a common prize, the vast territory between the Mississippi and the Alleghanies, was a political education for the colonies. The fact that they had acted together against the foreign enemy in the Mississippi valley prepared them for a more formal combination against any enemy whatever, even the king or parliament of the mother country, if either should prove hostile to the newly felt national interests and instincts of America. And yet it was very difficult to put this formal union into intelligible language when the necessity for it became imperative. The new nation fought its first war practically through without a government, with only such a substitute for a government as could be found in a body of delegates, chosen by the State Legislatures and recalled at pleasure, without any formal grant of powers from any source, and practically with only such powers of legislation as a general popular acquiescence and obedience might validate. A body thus constituted necessarily fell into disrespect just as rapidly as it fulfilled its function of getting rid of the invading force. An autocratic power would have brought the British face to face with the insurmountable difficulties of their undertaking in the second winter of the war; under the Continental Congress the war dragged along for seven years. Obedience was only accorded to it while the enemy was at the gates; and thus, with a firm hold on only New York and Newport, the British were able to put the country to the expense and danger of a general war, and even to carry on a formidable Southern campaign.

All through this period the Continental Congress was engaged in the effort to transform itself into a formally constituted body. The effort was burdened with enormous additional difficulties, through the practice of the State legislatures of recalling their delegates at pleasure. Not only was the final document of union to be ratified by the legislatures, but even in framing it, any delegate who showed himself too little actuated by respect for his own legislature's interests or prejudices was liable to summary recall and replacement by a more pliable instrument. It is no matter for surprise that the result of such deliberations was a document which was far more advantageous to the State legislatures than to the people at large. The "Articles of Confederation and Perpetual Union" gave Congress, in reality, no powers of government; all th were reserved to the legislatures. Congress was to no taxes, foreign or domestic, equip no armies, no control whatever over commerce, indi- the States. In all such matters of actual legislation, Congress was empowered only to make recommendations to the States, which the legislatures would pass upon finally and each for itself. Congress was, it is true, empowered to make treaties and borrow money, and the faith of the separate States was solemnly pledged that they would observe the one and repay the other; but these pledges proved to be of about as much value as such naked pledges usually are. Finally, no amendment or alteration was ever to be made without the ratification of every State legislature.

The Articles were adopted by the Continental Congress and recommended to the States, Nov. 15, 1777. Eight of the States, by their delegates, ratified them, July 9, 1778; and three more fell in before the end of the year. Delaware held out until February, 1779, and only Maryland refused. Her action was due to the appropriation by a number of the States of the western territory, which had been the prize of the French and Indian war. The charters of Massachusetts, Connecticut, Virginia, North Carolina, and Georgia had no defined western boundary; Virginia further asserted that her northern boundary ran northwest, instead of west, so that her territory continually widened as it advanced, and embraced the whole northwest; South Carolina claimed a narrow strip of territory running west from her north-west corner; even New York had vague claims to a western extension, and New Hampshire to the present State of Vermont. All these claims were in fact equally preposterous. Wolfe's successful battle on the Plains of Abraham had given this territory to the British Empire, and the successful struggle of the Revolution had transferred it to the United Colonies, not to any individual colony. It required nearly ten years, however, to convince the claimant colonies that this was the case, and they were influential enough to secure the insertion of a clause in the Articles by which the United States were prohibited from taking any territory from a State, though the power was given to decide land disputes between States. Maryland alone was sufficiently far-sighted to enforce her veto on the final ratification of the Articles until it was certain that the claimant States would not be allowed to appropriate the coveted territory. New York afforded Congress the opportunity to checkmate the troublesome claims. The Six Nations of New York Indians had long held a semi-feudal supremacy over the territory and Indians between the Mississippi and the Alleghanies. This had passed, if such an undefined right can be said to pass, to New York by conquest; and New York, in consideration of the recognition of her doubtful western boundary, transferred her western claims to Congress, March 1, 1781. On the same day Maryland ratified the Articles, for Congress had already pronounced in favor of the validity of the New York Six Nations claim, and the Confederation was therefore committed to the Maryland view. All the claimant States ceded their western claims within a few years thereafter, Georgia not until 1802. Maryland's action secured to the United States a general form of government, albeit a useless one. It was soon found that it secured to the United States neither order, nor revenue, nor an assured bond of union. The individual States exerted their full autonomy for almost exclusively selfish purposes. Their taxes were protective against one another; the requisitions of Congress for money were postponed, ignored, or tendered in the State's depreciated paper money; every amendment to the Articles calculated to give Congress

more power was vetoed by one or more States, and there seemed to be no present utility or hope of future improvement in the Articles of Confederation. The principal and interest of the public debt, the running expenses of the government, were unpaid; and there was a period of some months when Congress itself dissolved without any effective substitute, and there was no longer even an appearance of a national government. There was reason in Hamilton's summary: "A nation without a national government is an awful spectacle."

As the regulation of commerce was a strictly State affair, the commerce of Chesapeake Bay fell under the management of Virginia and Maryland. A proposition for a meeting of State Commissioners to settle disputes was turned by Virginia to national account. Her call was addressed to all the States, with the object of framing a commercial amendment to the Articles, to be ratified unanimously or not at all. Only five States sent delegates to Annapolis, Sept. 11, 1786, and the convention limited itself to debate and the recommendation of another convention, to be held at Philadelphia in the following year. Congress approved the call in the following February.

When the day assigned for the meeting of the new convention (May 14, 1787) arrived, all the States but Rhode Island had appointed delegates, though the New Hampshire delegates did not attend for several months. The better success of the second convention in this respect is to be largely attributed to the appearance of internal disorders in the States, the most startling being Shays's rebellion in Massachusetts, in the critical winter of 1786–87. To most of the leaders of the time there was but one consideration, order, which was superior to the claims of State independence, and the Massachusetts disorder, and the evident impotence of Congress, were thrown into the balance just in time to turn the scales in favor of the Constitution. When Washington, who was a delegate from Virginia, took the chair as president of the convention, the feeling of the delegates seems to have been much the same as that of Congress when it threw upon him the whole responsibility of the war in the trying times of the previous decade.

The peculiar difficulties of the convention can hardly be well understood without a reference to the division of the States into large and small States. There were at no time more than eleven States represented in the convention, for Rhode Island sent no delegates, and those of New Hampshire only attended after those of New York retired. Five of the eleven, Massachusetts, Connecticut, Virginia, North Carolina, and Georgia, were "large States," either on account of their present population or on account of their expectations of future western expansion. Pennsylvania was at various times on one side or the other, holding the balance of power. The large States came prepared with a plan of their own, which was presented by Edmund Randolph, of Virginia. It substituted a Congress of two houses, with real legislative powers, for the feeble Confederation Congress of one house, and introduced the germ of an executive and judiciary. But the plan was fatally marred by the evident determination of the large States to so arrange the new scheme of government as to throw all the power into their own hands. Both houses of Congress, though differing in numbers, were to be chosen proportionally by the States, so that the large States, which had been the claimant States, could combine and control both houses. When it is added that Congress was to choose the President and the judiciary, it will be seen that the "small States" had very considerable reason to take exception to this so-called "national plan." In opposition to it, they introduced, through William Paterson, of New Jersey, a plan of their own, continuing the Confederation Congress, giving it the power to control commerce, and adding the power to coerce States which should refuse to obey requisitions. Almost all the results of the Constitution were compromises between these two plans; the great chasm between the North and the South, which was to control the first century of the Constitution's active operation, appeared very little in the framing of it, except in the matters of slave representation and the slave trade.

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of each house of Congress and three-fourths of the States. A more radically national feature could hardly have been introduced; nor has any advocate of State sovereignty ever succeeded in reconciling his doctrine with this power of amendment. A "sovereignty" which grants to another power the right to fix and alter its rights, powers, and relations without limit cannot longer be classed as a sovereignty without a stretch of language of which English is not yet capable. As a corollary to this power of indefinite amendment, to Congress was given the power to admit new States without limit. Under this provision, the original thirteen States have already been nearly trebled—there are thirty-eight States in 1884; and, if fourteen States should be added, an amendment could be passed over the unanimously adverse vote of the original thirteen States. If State sovereignty can survive such a constitution of things, it can only be by supposing that the States made the Constitution with the purpose of violating it if it proved disagreeable to keep their pledges, a supposition which is practically solved in the doctrine of secession.

In addition to all this, the fundamentally national nature of the Constitution is expressed, as plainly as the language is capable of expressing it, in the following clause (Art. VI., Sec. 1): "This Constitution, and the laws of the United States which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the constitution or laws of any State to the contrary notwithstanding." It would be impossible here to enter into the question whether this clause was an abrogation of a previously existing State sovereignty, or an emphatic recognition of the fact that no State sovereignty had ever existed; in either case, the nonexistence of State sovereignty under the Constitution and the assertion from which this clause removes the ground for argument. To fasten it more firmly still, the Constitution provides that an oath to support it shall be taken by the members of the legislative, executive, and judicial departments of each of the State governments.

On the other hand, the controlling and universal desire of the people for the maintenance of State rights, as distinguished from State sovereignty, is written in almost every section of the Constitution. Not only are the States a recognized instrumentality in the execution of the provisions of the Constitution, essential to the election of President and Vice-President, to the election of the Senate, to the internal extradition of criminals, and to the power of amendment itself; the continued existence of the States is secured by the provision that no State shall ever be deprived of its equal suffrage in the Senate, without its own consent. It is difficult to see what stronger guarantees for State rights could be asked. Unless the spirit of the system be radically changed, the rights of Delaware, for example, become only more secure as the national power grows stronger; they are actually far more secure, under the guarantee of a powerful national protector, than if their only guarantee were "sovereignty" of Delaware. In fact, the principal enemy of State rights under the Constitution is the theory of State sovereignty under the Constitution. The Federal Constitution as the organic law and State constitutions are the autonomy guaranteed to the States by the national power. But there is this fundamental difference in the operations of the Federal and State *governments*, that the former exercises such powers as are granted to it by the Federal Constitution, while the latter exercise such powers as are not denied to them by the Federal or State constitutions. The former is a government of stipulated, and the latter of residual, powers. But it must be remembered, also, that a state of war, particularly if it is dangerous or within the limits of the country, will always result in the assumption of very doubtful powers by the Federal government, and the consequent peril of a radical alteration in the conception of the system, an alteration the more perilous because it must of necessity take place without calm consideration. The general perception of this underlying danger has made the nation one which is already very averse to war, and its tendency for the future seems to be increasingly in the same direction.

Passing from the nature of the Constitution to its practical features, we find the most prominent to be the legislative department; this has been treated in a separate article (see CONGRESS). Notwithstanding its prominence, it has, thus far in its history, encroached less upon the other departments of the government than in any other country in which a parliamentary system of any kind has been attempted. The other departments are the executive and judiciary, each of which has characteristics which are peculiar to the American system.

The Executive Department consists of the whole body of officers to whom is assigned the duty of enforcing the laws of the United States. At their head is the President, the only one of them who reaches his position by election; the others are appointed by the President, subject to the approval of the Senate, or their appointments are regulated by law. "Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments" (Art. II., Sec. 2). The President must be a natural-born citizen, of the age of thirty-five years, and resident in the country for fourteen years. He is chosen not by popular vote, but by the electoral system (explained in the next paragraph). There is nothing in the Constitution to prevent his indefinite re-election; but the popular prejudice against a third term is so strong as to amount to a practical prohibition. He is commander-in-chief of the army and navy; has the power to grant reprieves and pardons for offences against the United States, except in cases of impeachment; makes treaties, with the advice and consent of two-thirds of the Senate; and, during a recess of the Senate, makes temporary appointments to fill vacancies, expiring at the end of the next session of the Senate. He sends messages to Congress from time to time, giving information of the state of the Union, and recommending measures for consideration. He may call together both houses, or either house, in special session; and, if the two houses cannot decide on the time of adjournment, he may decide it for them. He, like the Vice-President, and all other civil officers, is removable on impeachment by the House of Representatives, trial by the Senate, and conviction by two-thirds of the senators. All the officers under the executive are organized into as many departments as may be provided by law; and the President has the constitutional right to call on the head of any department for his written opinion on any subject relating to

the duties of his department. Out of this has arisen the extra-constitutional term "cabinet," applied to these heads of departments collectively.

The electoral system controls the election of the President and Vice-President. Each State appoints, in such manner as its legislature may direct, a number of electors equal to the whole number of senators and representatives to which the State is entitled. Until about 1828 the legislature usually appointed the electors itself; since that year they have been chosen by popular vote, except that South Carolina only made the change in 1868. The electors meet in their States, and vote by ballot for President and Vice-President, one at least of the two names to be from some other State than their own. Their votes are sent to the President of the Senate. He opens all the certificates in the presence of the two houses, "and the votes shall then be counted." The persons having a majority of the electoral votes for President and Vice-President are elected. If there is no election for President, the House of Representatives chooses a President, voting by States, each State having one vote. If there is no election for Vice-President, the Senate chooses a Vice-President, voting as usual. At first the electors simply voted for two persons, without distinguishing the votes for President and Vice-President; for it was presumed that the electors were to exercise an intelligent choice among the candidates, and no one saw anything improper in the action of Gerry, a Democratic elector, in voting on personal grounds for Adams, a Federalist, against Jefferson, the head of his own party. Just before the election of 1800 the electors became fixed in that nullity which has since been characteristic of them; it became a point of honor that each elector should vote for the two candidates of his own party. The inevitable result was that, whichever party was successful, its two candidates would have a tie vote, unless some one of its electors should throw away one of his votes on a rank outsider. The result took place in 1800–1, when Jefferson and Burr were a tie in the electoral vote, and the Federalist majority in the House of Representatives very nearly elected Aaron Burr to the office of President of the United States. To meet the new conditions, the twelfth amendment, which fixed the system as above given, was ratified in 1804. Though the Vice-President is chosen at the same time and in the same manner as the President, he is no part of the executive department. His only function is to preside over the Senate, where he has no vote except in case of a tie. Should the President be impeached, the Chief Justice of the Supreme Court is called to preside over the Senate during the trial. The Vice-President is purely a stand-by, in readiness to take the Presidency in case of the President's removal, death, resignation, or inability; and in practice is rarely admitted to any great influence on the administration.

Thus far the Constitution provides the general outlines of the executive department, the election of its head, and the appointment of its subordinates. These outlines were to be filled up by the legislative department. Various acts of Congress have divided the executive officers into seven departments, and each department into bureaux, such as the internal revenue bureau in the treasury department, and the census and pension bureaux in the department of the interior. The departments are as follows, with the year of their erection into a distinct department: state (1789); of the treasury (1789); of justice (1789); of the navy (1798); office (1829); of the interior (1849.) the officers of these depart by law that the work of the tive. In like manner the outlines tem have been filled up. Acts of Co ignated the day on which the poi cast for electors, the day on which meet and vote, the manner in which electors are to be transmitted to the Pr Senate, while copies are to be kept of Congress has gone further and asserted power in the count of the electoral vo never been successfully defended. power has but two arguments in its favor: no agent is intrusted with the power to c toral votes; and the direction that ce votes are to be opened by the Pre "in the presence" of the two hou C this slender foundation, since 18 , co thorities have built up an indefinite electoral votes, a power to pass judg form or substance, to decide betwe the same State, and even to reject which seemed invalid to the majorit houses. Nothing would be easier th pass general laws defining the forms o the electoral votes from the State a guiding the President of the Senate in opening *the* certificates. But to do abandonment by Congress of a pow of controlling force in a presiden never been done. The special a rdin lies in the fact that the electoral co is to and disputes are to be decided, by two pendent agents—the two houses—w either unanimous under the control of or hopelessly at odds. In the latter cas two houses are controlled by different no hope of the two judges coming to and recourse must be had to some h tional shift as the Electoral Comm would be proper to characterize clumsy device to cloak the inhe "canvass" by two absolutely ind

The Judiciary Department has only a few bold outlines: most of has been left to legislation. The C provides for one Supreme Court. courts as Congress may from establish, and directs that the during good behavior. The in been established are the d diction covers a State or par peal to circuit courts, whose jurisd States each, with an appeal to There are district judges for t judges for each of the nine cir court justices, each of whom p cases in which ambassadors, o consuls are concerned, or in the supreme court has orig of admiralty or maritime ju the United States is a party, different States, or "Federal next paragraph), the supreme

risdiction. Process runs through the United States, but trials for crimes are to take place in the State in which the crimes are committed. For crimes committed out of the jurisdiction of any State the place of trial is fixed by statute.

"Federal cases," as they are commonly called, are "all cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority." The grant of such a jurisdiction, under a written constitution, has made the Federal judiciary the arbiter of the constitutionality of the laws passed by Congress, and even of State constitutions and laws, so far as they are alleged to be in contravention of the Federal Constitution. Such a jurisdiction was really unprecedented when it was framed, but it cannot be said that it has proved dangerous in practice. When the supreme court has decided that a law is not warranted by the powers granted to Congress by the Constitution, State courts follow the decision, and it is practically impossible to punish any one for violating the law. It is certainly remarkable to see the legislative and executive, with the physical force of a nation of 55,000,000 behind them, quietly yielding to the decisions of nine men assembled in the supreme court chamber at Washington; but it is not quite true, as it is usually stated abroad, and sometimes at home, that the supreme court is the final arbiter of all constitutional questions. The court has always held that it has no jurisdiction of purely political questions, questions whose decision came fairly within the province of Congress or the President, and whose decision seemed likely to bring the court into open conflict with the [illegible] branches of the government. Thus, while Congress was enforcing reconstruction of the Southern States in 1867–8, the supreme court refused to allow the constitutionality of the reconstruction laws to be brought up for decision. Theoretically the court is as much at the mercy of the other two branches as the House of Lords is in Great Britain, and could be swamped at any time by the creation of new judges; but no such measure has ever been confessedly employed, though it has been alleged to have been the motive of some changes. As a very general rule the court has been so intrenched in popular regard that no political party would willingly be responsible for an attack on it.

Limitations on the United States.—The writ of *habeas corpus*, according to the supreme court, can never be suspended in the United States by any power. The *privilege* of the writ is only to be suspended in case of rebellion or invasion, in regard to soldiers, sailors, or prisoners of war; and even in such cases the courts, when open, are still to issue the writ, and decide on the hearing whether the party has lost the privilege of the writ or not. No bill of attainder or *ex post facto* law can be passed. Direct taxes can only be laid in proportion to the census. No export duty can be laid, nor can any commercial regulation give a preference to the ports of one State over those of another. No money is to be drawn from the treasury except by appropriations. No title of nobility is to be granted. Treason is to consist only in levying war against the United States, or in adhering to their enemies, giving them aid and comfort. It is to be proved only by confession in open court, or by two witnesses to the same overt act. Its punishment is to be defined by law, but cannot work corruption of blood, or forfeiture, except during the life of the criminal. No new State can be formed within a State, or by the junction of two or more States or parts of States, without the consent of the legislatures of the States concerned, as well as of Congress.

State Privileges.—The public acts, records, and judicial proceedings of each State are to receive full faith and credit in all the other States, and Congress may by general law prescribe the manner of their authentication. The citizens of one State are entitled to all the privileges and immunities of citizens in all the other States. Persons charged with crime, fleeing from one State to another, are to be delivered up for trial by the governor of the State to which he has fled on requisition from the governor of the State from which he fled. A similar provision with regard to fugitive slaves has become obsolete with the abolition of slavery. To each State a republican form of government is to be guaranteed by the United States, and each is to be protected from invasion by the same power. In case of domestic violence against the established form of the State government, the State legislature, or the governor, if the legislature cannot be convened, can apply for and receive Federal force for its support.

Limitations on the States.—The States are absolutely prohibited from entering into any treaty, alliance, or confederation, granting letters of marque and reprisal, coining money, emitting bills of credit, making anything except gold and silver a legal tender, passing any bill of attainder, *ex post facto* law, or law which impairs the obligation of contracts, and granting any title of nobility. They are prohibited, unless Congress pass a consenting statute, from laying any duties on exports or imports above what is necessary for executing the inspection laws of the State, from laying duties of tonnage, from keeping troops or ships of war in time of peace, from entering into agreements or compacts with another State or with a foreign power, and from engaging in war, unless actually invaded or in imminent danger. Even if Congress consent to the laying of duties on imports or exports by a State, the net produce is to be for the use of the treasury of the United States, and the laws are to be subject to the revision and control of Congress. There are also certain concurrent powers of the States which may be suspended by the exercise of the corresponding powers by Congress: the making or altering by Congress of regulations as to the times, places, and manner of holding elections for senators and representatives supersedes State laws on those subjects, except as to the places of holding elections for senators, and State insolvency laws are superseded by a national bankrupt law.

The Territories are under the control of Congress, and have only such powers of self-government as Congress may see fit to grant them. In practice, however, the whole territorial system of the United States has been controlled by the purpose of developing the Territories into States: their powers of self-government have been increased just as fast as they have grown in population, and they have been treated as inchoate States.

Amendments become valid as parts of the Constitution when proposed by two-thirds of both Houses of Congress, and ratified by legislatures or conventions (as Congress may decide) in three-fourths of the States. [illegible] ead of the original proposition by Con[illegible] directed to call a new Federal con[illegible] amendments, if it is called for [illegible] State legislatures. The first

method of amendment alone has been employed up to this time, and has resulted in the adoption of fifteen amendments which are not incorporated in the Constitution, but are added to it as a supplement. They are as follows:

(I–X.) The first ten amendments were an outcome of the struggle over the adoption of the Constitution. Many of the States which ratified it did so with a strong recommendation of amendments; and one State (New York) desired to make her ratification conditional on the prompt consideration by Congress of the amendments proposed by New York. The supporters of the Constitution would accept nothing but unconditional ratification, and yet there seemed to be a necessity for some amendments as a means of removing the apprehensions of the more moderate of the opposition. When the first Congress met under the Constitution, twelve amendments were proposed by Congress, and ten of these, having been ratified by three-fourths of the State legislatures, became the first ten amendments. They are guarantees of popular rights: (I) to freedom of religion, speech, the press, and petition; (II) to keep and bear arms; (III) to be free from the quartering of soldiers in their houses, except by statute in time of war; (IV) to be secure against unreasonable searches and seizures, and against general warrants; (V) to be held to answer for capital or infamous crimes only by indictment, or presentment by a grand jury, except under martial law; not to be brought twice into jeopardy of life or limb for the same offence; not to be compelled to bear witness against one's self; not to be deprived of life, liberty, or property without due process of law; and not to be deprived of property without just compensation; (VI) in criminal trials, to speedy and public trial by jury, in the district, previously ascertained by law, where the crime was committed, and to have counsel and compulsory process for witnesses; (VII) to trial by jury in suits at common law, where the matter in dispute is valued at more than twenty dollars; (VIII) to be secure from excessive bail and fines, and from cruel and unusual punishments; (IX) to retain their reserved rights without disparagement or question from the rights granted in the Constitution; (X) to have secured to themselves or to the States the rights not granted to the United States or prohibited to the States by the Constitution. These amendments were proposed by Congress Sept. 25, 1789, and declared ratified Dec. 15, 1791.

(XI) The Constitution gives the supreme court jurisdiction of cases to which a State shall be a party. The supreme court at once construed this to give to individuals the right to sue a State. To avoid this construction, the eleventh amendment was proposed by Congress March 5, 1794, and declared ratified Jan. 8, 1798. It prohibited suit against a State in the Federal courts by citizens of another State or of a foreign state.

(XII) The twelfth amendment was proposed by Congress Dec. 12, 1803, and declared ratified Sept. 25, 1804. It altered the electoral system into its present form, as previously described.

(XIII) The thirteenth amendment was proposed by Congress Jan. 31, 1865, and declared ratified Dec. 18, 1865. Pres. Lincoln's Emancipation Proclamation of Jan. 1, 1863, had simply freed the slaves in the States which had not abandoned armed resistance to the laws. It had committed the army and navy to the maintenance of the freedom of such persons; and it necessarily excepted from the operation of the proclamation parts of Louisiana and Virginia, and the States of Kentucky and Delaware. Missouri and Maryland had begun an emancipation of their own; but, as to the other former slave States, there was nothing to prevent the practical or open transfer of legitimate slaves from Kentucky and Delaware, and the re-establishment of slavery. The thirteenth amendment cut the difficulty out by the roots, by forever forbidding slavery within the limits of the United States. During the summer and autumn which followed Pres. Lincoln's assassination, the conventions of the various Southern States, assembled under the lead of Pres. Johnson, ratified this amendment as their first step to re-entering the Union. The amendment thus obtained a three-fourths ratification with comparatively little difficulty; and, when Congress met in December, Secretary Seward proclaimed the amendment ratified, as if to commit Congress to the Southern conventions which had ratified it. Congress, however, declined to be so committed, or to recognize the applicants for seats from the States reconstructed under "the President's policy."

(XIV) The fourteenth amendment was proposed by Congress June 16, 1866. It comprised the terms of readmission offered by Congress to the States which had been in insurrection. It was in five sections. (1) All persons born or naturalized in the United States, not having transferred their allegiance, were declared citizens of the United States and of the State of their residence. This was to avoid the Dred Scott decision of the Supreme Court in 1857 (see that title). No State was to make any law to abridge the privileges or immunities of citizens of the United States, or deny to any person the equal protection of the laws. (2) If any State should refuse the ballot to any portion of its male citizens over 21, the State's representatives in Congress were to be reduced proportionally. (3) The higher classes of Confederate officeholders, who had previously taken an oath to support the Constitution of the United States, were not to hold any office, civil or military, under the United States or the State until their disabilities should be removed by a vote of two-thirds of both houses of Congress. (4) The public debt of the United States was not to be questioned; that incurred in aid of insurrection was to be forever void. (5) Enforcing powers were given to Congress.

The terms offered were rejected; the S
legislatures refused to r fy the amendment,
out them a three-f ratification of the
ment was out of the u on. The C
elections of 1866, for
1867–9, gave the Repub ns
both houses, sufficient o overri
veto for the remainder of his
the opening months of 1867,
in Congress framed and passed
Act, to be carried out by the succee
the new Congress, which met in
plementary acts to strengthen it.
acts divided the insurrectionary S
districts, each under command of
who was to repress disorder and
commanding officer in each
voters of the State, including
all persons who would be u
the (proposed) fourteenth
essential feature of the C

struction; those who were to be excluded from office under the third section of the fourteenth amendment were to be excluded from reconstruction, from registration, from voting, and from membership in the conventions which were to frame the new State constitutions. When these conventions should frame constitutions which should seem to Congress republican, and when their legislatures should ratify the fourteenth amendment, Congress promised to admit their Senators and Representatives. This plan of reconstruction was followed out, the fourteenth amendment received a three-fourths vote of the States, and it was declared ratified July 21, 1868.

(XV) The second section of the fourteenth amendment, reducing a State's representation in Congress in proportion to its exclusion of any class of voters from the right of suffrage, was not found satisfactory in practice. It was not easy to secure any initiative in enforcing it, and it has really been a dead letter since its passage. To reach its object more directly, the fifteenth amendment was proposed by Congress Feb. 27, 1869, and was declared ratified March 30, 1870. It forbade the United States or any State to deny or abridge the right of citizens to vote, on account of race, color, or previous condition of servitude, and gave Congress enforcing power. Educational or property limitations could still be imposed by the States, but they must be imposed on whites and blacks alike. This closes the list of alterations in the Constitution up to the present time.

Party contest in the United States, and to a large extent in the States also, turns on the construction of the Constitution. The instrument, as has been stated, is framed in outline only, and the outlines are necessarily to be filled out with legislation. If legislation had been restricted, as under the Confederation, to powers *expressly* granted, every invention, every development of society, would have been only a new danger and difficulty to the unfortunate government of the United States. It would have been a strain to make the express power to establish post-offices and post-roads cover the new case of railways; an impossibility to stretch it to cover the later case of telegraphs. But the Constitution, after enumerating the powers of legislation, adds the power "to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or officer thereof." It is true that the Supreme Court has decided that the word "necessary" may mean "absolutely necessary," "very necessary" or simply "necessary;" that Congress is the judge as to whether proposed legislation comes under any of these heads; and that "an act of Congress is not to be pronounced unconstitutional unless the defect of power to pass it is so clear as to admit of no doubt." These rules might seem to lead to absolute government by Congress; but a more abiding guarantee is found in the influence of this question of construction on the votes of constituents and the action of their representatives. All admit that Congress has both express and implied powers. Some admit only such implied powers as can be deduced *directly* from the expressed powers; others are willing to deduce implied powers from implied powers; while others, acknowledging the legality of both, have a strong aversion to any but the more direct powers. There is thus opportunity for the formation of two great parties. for an indefinite variety of individual opinions, and for party contest in every form. The general line of division has been into strict constructionists and broad constructionists, the latter being usually called loose constructionists by their opponents. The former have been represented by one party in our history—the Democratic party, usually called Republican from 1792 until about 1815. The latter have been represented by three parties—the Federal party (1789–1817), the Whig party (1832–52), and the Republican party since 1854 (see the names of the parties). But one result of an accession of the strict construction party to power has always been that it has adopted and put in practice on its own account various points of broad construction, which, when reaffirmed by its opponents on returning to power, have passed beyond question. The general drift of American constitutional law has thus been toward a broad construction, but the drift has not been unhealthily rapid.

See Bancroft's, Hildreth's, and Von Holst's *Histories of the United States;* Story's *Commentaries on the Constitution;* Kent's *Commentaries;* *The Federalist;* Curtis's and Bancroft's *Histories of the Constitution;* Elliot's *Debates,* Poore's *Federal and State Constitutions;* Farrar's *Manual of the Constitution;* Cooley's *Constitutional Limitations;* Hurd's *Theory of our National Existence;* Lalor's *Cyclopædia of Political Science.* (A. J.)

II. STATE CONSTITUTIONS.—Under this head is presented a synopsis of the present political organization of the several States, together with the dates of their ratification of the Constitution of the United States, or their admission as States, and of their successive constitutions. The numbers prefixed indicate in case of the original thirteen States the order of their settlement; in case of the other States the order of their admission into the Union:

22. *Alabama.*—Organized as a Territory March 3, 1817. Admitted as a State Dec. 14, 1819. Its successive constitutions bear date Aug. 2, 1819; Dec. 20, 1865; July 13, 1868; Dec. 6, 1875. Elections are held biennially on the first Monday in August of even years. A voter must be a male citizen of the United States, or one who has declared his intention to become such, 21 years of age, 12 months a resident of the State, and 3 months of the county. The legislature meets biennially on the Tuesday after the second Monday in November in even years. Its session is limited to 50 days. A representative must be a qualified voter in the county. A senator must be 27 years of age and a qualified voter in his district. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is 6 years. They may be removed by impeachment, or by the governor on the address of two-thirds of the general assembly. The governor must be 30 years of age, 10 years a resident of the United States, and 7 years of the State. His term is 2 years and his salary $3000. He has the veto power, but may be overruled by a majority of the whole number of members of each house. He has also the pardoning power.

25. *Arkansas.*—Organized as a Territory March 2, 1819. Admitted as a State June 15, 1836. Its successive constitutions bear date Jan. 30, 1836; Jan. 19, 1864; Feb. 11, 1868; Oct. 13, 1874. Elections are held biennially on the first Monday of September. A voter must be a male citizen of the United States, or one who has declared his intention of becoming such, 21 years of age, a resident of the State for 12 months, of the county for six months, and of the precinct for 1 month. The legislature meets biennially on the first Tuesday after the second Monday in January in odd years. The session is limited to sixty days. A representative must be 21 years of age, a citizen of the United States, a resident of the State for 2 years, and of the county or district for 1 year. A senator must be 25 years of age, and must have the other qualifications of a representative. The

term of a representative is 2 years, that of a senator is 4 years. The judges are elected by the people. Their term of office is in the supreme court 8 years; in a circuit court 4 years; and in a county court 2 years. The judges of the supreme and the circuit courts may be removed by the governor on the joint address of two-thirds of the general assembly. The governor and lieutenant-governor must each be a citizen of the United States, 30 years of age, and for 7 years a resident of the State. The governor's term of office is 2 years and his salary $5000. He has both veto power and pardoning power.

31. *California.*—Formerly included in Mexico, it was ceded to the United States Feb. 2, 1848, and admitted as a State Sept. 9, 1850. Its successive constitutions bear date Nov. 13, 1849; May 7, 1879. Elections are held annually on the first Tuesday of November. A voter must be a male citizen of the United States, 21 years of age, not a native of China; he must have been a resident of the State 1 year, of the county or district 90 days, and of the precinct 30 days. The legislature meets biennially on the first Monday after the first day of January in the odd years. The session is limited to 60 days. A representative must be 21 years of age, a citizen and inhabitant of the State, and of the county or district 1 year before the election. A senator must be 25 years of age, and must have the other qualifications of a representative. The term of a representative is 2 years, that of a senator is 4 years. The judges are elected by the people. The term of a judge of the supreme court is 12 years, of a superior county court 6 years. A judge may be removed by a concurrent vote of both houses of the legislature, adopted by a two-thirds vote of each. The governor and lieutenant-governor must each be 25 years of age, and for 2 years a citizen of the United States and resident of the State. The governor's term of office is 4 years and his salary is $7000. He has the veto power, but may be overruled by a two-thirds vote. He has also the pardoning power.

38. *Colorado.*—Organized as a Territory Feb. 28, 1861. Admitted as a State by act March 3, 1875, which took effect Aug. 1, 1876. Its constitution bears date July 1, 1876. Its elections are held on the first Tuesday in November. A voter must be a male citizen of the United States, or a person who has declared his intention to become a citizen 4 months before he offers to vote; he must be 21 years of age and a resident of the State for 6 months. The legislature meets biennially on the first Wednesday of January in odd years. The session is limited to 40 days. A representative must be 25 years of age, a citizen of the United States, and for 1 year a resident of the county or district. A senator must have the same qualifications. The term of a representative is 2 years, that of a senator 4 years. The judges are elected by the people. Their term of office is in the supreme court 9 years; in district courts 6 years; in county courts 3 years. They may be removed by impeachment. The governor and lieutenant-governor must each be a citizen of the United States, 30 years of age, and for 2 years a resident of the State. The governor's term of office is 2 years and his salary $3000. He has the veto power over acts of the legislature, but may be overruled by a two-thirds vote. He has also pardoning power.

8. *Connecticut.*—Ratified the Constitution of the United States Jan. 9, 1788. On becoming a State in 1776 it continued its charter of 1662 in force as the organic law, but a new constitution was adopted Oct. 5, 1818. Elections are held on the Tuesday after the first Monday in November. A voter must be a white male citizen of the United States, 21 years of age, a resident of the State for 1 year, and of the district 6 months, sustaining a good moral character, and being able to read any article of the constitution or any section of the statutes of the State. The legislature meets annually on the first Wednesday of January. Both senators and representatives must have the same qualifications as voters, and their term is 1 year. The judges are elected by the general assembly on nomination by the governor. Their term is 8 years. They may be removed by the governor, and no person may hold a judicial office after reaching the age of seventy. The governor and lieutenant-governor must have the same qualifications as voters. The governor's salary is $2000 and his term is 1 year. He has the veto power, but may be overruled on reconsideration by both houses of the assembly. He has also the pardoning power.

6. *Delaware.*—Ratified the Constitution of the United States Dec. 7, 1787. Its successive constitutions bear date Aug. 27, 1776; June, 1792; Nov. 8, 1831. Elections are held on the Tuesday next after the first Monday in November. A voter must be a free white male citizen of the United States, 21 years of age, a resident of the State for 1 year, and of the county for 1 month; he must have paid a county tax 6 months before election. The legislature meets biennially on the first Tuesday of January in odd years. A representative must be 24 years of age, a citizen of the State for 3 years, and an inhabitant of the county or district for the last year of that time. A senator must be 27 years of age, with other qualifications of a representative, and must have a freehold estate of 200 acres, or an estate of £1000 at least. The term of a representative is 2 years, and of a senator 4 years. Judges are appointed by the governor and hold their offices during good behavior, but may be removed by impeachment. The chancellor receives a salary of $1100, chief-justice of supreme court $1200, and associate-justice $1000. The governor must be 30 years of age, a citizen and inhabitant of the United States for 12 years, and of the State for 6 years. His term of office is 4 years, and his salary is $2000. He has a veto power on acts of the legislature, but may be overruled by a two-thirds vote. He has also the pardoning power.

27. *Florida.*—Formerly belonging to Spain, it was ceded to the United States in 1819. Organized as a Territory March 30, 1822. Admitted as a State March 3, 1845. Its successive constitutions bear date Dec. 3, 1838; Nov. 7, 1865; 1868; 1886. Elections are held biennially on the first Tuesday after the first Monday of November in odd years. The session is limited to 60 days. A voter must be a male citizen of the United States, or one having made declaration of his intention to become such; he must be a resident of the State for 1 year, and of the county for 6 months. The legislature meets on the first Tuesday after the first Monday of January biennially. Senators and representatives must be duly qualified electors in the respective counties or districts which they represent. The term of a representative is 2 years, that of a senator 4 years. Judges are appointed by the governor and confirmed by the senate. Judges of the supreme court hold their office for life or during good behavior; judges of the circuit court 8 years, and of the county courts 4 years. Judges of the supreme court receive a salary of $3000, and of the circuit courts $2500. They may be removed by impeachment. The governor and lieutenant-governor must each be a qualified elector, a citizen of the United States for 9 years and of the State for 3 years. The governor's term is 4 years and his salary $3,500. He has a veto power on acts of the legislature, but may be overruled by a two-thirds vote. The pardoning power is vested in the governor, justices of the supreme court, and attorney-general, or a major part of them, of whom the governor shall be one.

13. *Georgia.*—Ratified the Constitution of the United States Jan. 2, 1788. Its successive constitutions bear date Feb. 5, 1777; Jan. 4, 1789; May 30, 1798; Nov. 7, 1865; March 11, 1868; Dec. 5, 1877. Elections are held biennially on the first Wednesday of October in even years. A voter must be a male citizen of the United States, or one having declared his intention to become such; 21 years of age, a resident of the State for 6 months, and of the county or district for 30 days, and must have paid his taxes. The legislature meets on the first Wednesday in November in even years. The session is limited to 40 days. A representative must be 21 years of age, a citizen of the United States, and a citizen of the State for 2 years, and for 1 year a resident of the county for which he is chosen. A senator must be 25 years of age, a citizen of the United States, 4 years citizen of State, and 1 year resident of his district. The term of a representative is 2 years, and that of a senator 4 years. The judges are elected by the legislature. Their term is in supreme court 6 years, in superior courts 4 years. They may be removed by the governor on the address of two-thirds of each branch of the general assembly, or by impeachment and conviction thereon. The governor must be 30 years of age, 15 years a citizen of the United States, and

6 years a citizen of the State. His salary is $4000 and his term is 4 years. His veto may be overruled by two-thirds vote. He has pardoning power.

21. *Illinois.*—Organized as a Territory Feb. 3, 1809. Admitted as a State Dec. 3, 1818. Its successive constitutions bear date Aug. 26, 1818; Aug. 31, 1847; July 2, 1870. Elections are held on the Tuesday next after the first Monday in November. A voter must be a male citizen of the United States, 21 years of age, a resident of the State for 1 year, and of the election district for 90 days. The legislature meets biennially on Wednesday next after the first Monday in January of odd years. A representative must be 21 years of age, a citizen of the United States, 5 years a resident of the State, and 2 years of his district. A senator must be 25 years of age, and have the other qualifications of a representative. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term of office is in supreme court 9 years; in appellate and in circuit courts 6 years; in county courts 4 years. They may be removed by the general assembly on concurrence of three-fourths of all the members. The governor and lieutenant-governor must each be 30 years of age, and for 5 years a citizen of the United States and of the State. The governor's term is 4 years and his salary is $6000. His veto may be overruled by a two-thirds vote. He has pardoning power.

19. *Indiana.*—Organized as a Territory May 7, 1800. Admitted as a State Dec. 11, 1816. Its successive constitutions bear date June 29, 1816; Feb. 10, 1851. Elections are held on the first Tuesday in November. A voter must be a male citizen of the United States, 21 years of age, a resident of the State 6 months, and, if a foreigner, 1 year in the United States. The legislature meets biennially on the Thursday next after the first Monday of January in even years. The session is limited to 60 days. A representative must be 21 years of age, a citizen of the United States, 2 years inhabitant of the State, and 1 year of his county or district. A senator must be 25 years of age, and have all other qualifications of representative. The term of a representative is 2 years, and of a senator 4 years. Judges are elected by the people. Their term is in supreme court 7 years, in circuit courts 6 years, and in courts of common pleas 4 years. They may be removed by the supreme court. The governor and lieutenant-governor must each be 30 years of age, 5 years a citizen of the United States and of the State, and not holding any other office. The governor's term is 4 years and his salary $3000. His veto may be overruled by a majority vote. He has pardoning power.

28. *Iowa.*—Organized as a Territory June 12, 1838. Admitted as a State Dec. 28, 1846. Its successive constitutions bear date Aug. 3, 1846; Aug. 3, 1857. Its elections are held on the first Tuesday of November. A voter must be a male citizen of the United States, 21 years of age, 6 months a resident of the State, and 60 days of the county. The legislature meets biennially on the second Monday of January in even years. A representative must be 21 years of age, a male citizen of the United States, 1 year an inhabitant of the State, and of his county or district. A senator must be 25 years of age and have the other qualifications of a representative. The term of a representative is 2 years, and of a senator 4 years. Judges are elected by the people. Their term is in supreme court 6 years, in district courts 4 years. Their salary is in supreme court $2000; in district courts $1600. They may be removed by the senate. The governor and lieutenant-governor must each be 30 years of age, a citizen of the United States, and a resident of the State 2 years previous to election. The governor's term is 2 years and his salary $2500. His veto may be overruled by a two-thirds vote. He has pardoning power.

34. *Kansas.*—Organized as a Territory May 30, 1854. Admitted as a State Jan. 29, 1861. Its successive constitutions bear date Dec. 15, 1855; May, 1858; Oct. 4, 1859. Elections are held on the Tuesday next after the first Monday in November. A voter must be a white male citizen of the United States, or one having declared his intention to become such, 21 years of age, 6 months resident of the State. The legislature meets biennially on the second Tuesday of January in odd years. The sessions are limited to 50 days. Senators and representatives must be duly qualified voters in their county or district. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is in supreme court 6 years, in district court 4 years. They may be removed by resolution of both houses of the legislature, two-thirds of the members concurring. The governor and lieutenant-governor must each possess the qualifications of an elector at the time of his election. The governor's term is 2 years and his salary $3000. His veto may be overruled by a two-thirds vote. He has pardoning power.

14. *Kentucky.*—Formed out of Virginia. Admitted as a State by act of Congress, Feb. 4, 1791, which took effect June 1, 1792. Its successive constitutions bear date April 19, 1792; Aug. 7, 1799; June 11, 1850. Elections are held on the first Tuesday in November. A voter must be a male citizen of the United States, 21 years of age, 2 years resident of the State, and 1 year of the county. The legislature meets biennially on the first Monday in December of the odd years. Its session is limited to 60 days. A representative must be 24 years of age, a citizen of the United States, 2 years resident of the State, and 1 year of the county. A senator must be a citizen of the United States, 30 years of age, 6 years resident of the State, and 1 year of the district. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is in the court of appeals 8 years; in the circuit courts 6 years; in the county courts 4 years. They may be removed by the governor on the address of two-thirds of each house of the general assembly. The governor and lieutenant-governor must each be a citizen of the United States, 35 years of age, and 6 years a resident of the State. The governor's term is 4 years and his salary $5000. His veto may be overruled by a majority vote. He has pardoning power.

18. *Louisiana.*—Formerly belonging to France, but ceded to Spain in 1763, restored to France in 1801, and sold by Napoleon to the United States in 1803. Organized as a Territory March 3, 1805. Admitted as a State by act of Congress, April 8, 1812, which took effect April 30, 1812. Its successive constitutions bear date Jan. 22, 1812; Nov. 5, 1845; Nov. 1, 1852; September, 1864; Aug. 18, 1868; July 23, 1879. Elections are held every four years on Tuesday next after the third Monday of April. A voter must be a male citizen of the United States, by birth or naturalization, or one who has declared his intention to become such, 21 years of age, 1 year resident of the State, 6 months of the parish, and 30 days of the ward or precinct. The legislature meets biennially on the second Monday of May in even years. Its session is limited to 60 days. A representative must be an elector, 5 years a resident of the State, and 2 years of the parish or district. A senator must be 25 years of age, and have the same qualifications as a representative. The term of each is 4 years. Judges of the supreme court are appointed by the governor, by and with the advice and consent of the senate. Their term is 8 years. Judges of the courts of appeal are elected by the assembly in joint session. In each court one judge has a term of 8 years, and the other of 4 years. Judges of the district courts are elected by the people for terms of 4 years. Judges may be removed by impeachment, or by the governor on the address of two-thirds of the members of each house of the assembly. The governor and lieutenant-governor must each be 30 years of age, 10 years a citizen of the United States and resident of the State, and must not hold office under the United States within 6 months preceding the election. The governor's term is 4 years and his salary $4000. His veto may be overruled by two-thirds vote. He has pardoning power, on the recommendation of the lieutenant-governor, attorney-general, and presiding judge of the court in which conviction was had, but not in cases of impeachment and treason. The latter crime may be pardoned by the general assembly.

23. *Maine.*—Formerly a part of Massachusetts, was admitted as a State March 15, 1820. Its constitution bears date Jan. 5, 1821. Elections are held on the second Monday of September. A voter must be a male citizen of the United States, 21 years of age, a resident of the State 3 months before the election. The legislature meets biennially on the first Wednesday of January in odd years. A representative must be 21 years of age, 5 years a citizen of the United States, 1 year resident of State, and 3 months of county or district. A senator must be 25 years of age, and have the

other qualifications of a representative. The term of representatives and senators is 2 years. Judges of the supreme judicial court are appointed by the governor, with the consent of council, and serve for 7 years. They may be removed by impeachment, or by address of both branches of the legislature to the executive. The governor must be 30 years of age, a natural-born citizen of the United States, and 5 years a resident of the State. His term is 2 years and his salary $2500. His veto may be overruled by a two-thirds vote. He has pardoning power, and is aided by an executive council.

9. *Maryland.*—Ratified the Constitution of the United States April 28, 1788. Its successive constitutions bear date Nov. 11, 1776; Jan. 4, 1851; Oct. 13, 1864; Sept. 18, 1867. Elections are held on the Tuesday next after the first Monday in November. A voter must be a white male citizen of the United States, 21 years of age, 1 year resident of State, and 6 months of county or district. The legislature meets biennially on the first Wednesday in January in even years. Its session is limited to 90 days. A representative must be 21 years of age, a citizen of the State, and 3 years resident of the same, and 1 year a resident of the county or district. A senator must be 25 years of age, and have the other qualifications of a representative. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people, and hold their office in supreme court 15 years. They may be removed by the governor on conviction, or on the address of two-thirds of the general assembly. The governor must be 30 years of age, 10 years a citizen of the United States, 5 years a resident of the State, and a qualified voter. His term is 4 years and his salary is $4500. His veto may be overruled by a two-thirds vote. He has pardoning power.

2. *Massachusetts.*—Ratified the Constitution of the United States Feb. 6, 1788. Its constitution is dated March 2, 1780. Elections are held on Tuesday next after the first Monday of November. A voter must be a male citizen, 21 years of age, 1 year a resident of the State, and 6 months of the county or district; he must have paid taxes within 2 years, and be able to read the constitution and to write his name. The legislature meets annually on the last Wednesday of May. A representative must be for 1 year a resident of his district. A senator must be an inhabitant of the State for 5 years and inhabitant of his district. The term of senators and representatives is 1 year. Judges are appointed by the governor, by and with the advice of the council, and hold their office during good behavior. They may be removed by the governor with the consent of the council. The executive department consists of a governor and lieutenant-governor, and the governor is aided by an executive council. The governor must be an inhabitant of the State for 7 years, possessing a freehold of £1000, and must be of the Christian religion. His term is 1 year and his salary $5000. His veto may be overruled by a two-thirds vote. He has pardoning power.

26. *Michigan.*—Organized as a Territory Jan. 11, 1805. Admitted as a State Jan. 26, 1837. Its successive constitutions bear date Nov. 2, 1835; Aug. 15, 1850. Elections are held on Tuesday next after the first Monday of November. A voter must be 21 years of age, 3 months resident of the State, and 10 days of township or ward. The legislature meets biennially on first Wednesday of January in odd years. Senators and representatives must be qualified electors in their respective districts. Their term is 2 years. Judges are elected by the people. Their term is in the supreme court 8 years, in the circuit courts 6 years. They may be removed by the governor on a concurrent resolution of two-thirds of the members of the legislature. The governor and lieutenant-governor must each be 30 years of age, 5 years a citizen of the United States, and 2 years a resident of the State. The governor's term is 2 years and his salary $1000. He has the veto power, but may be overruled by a two-thirds vote. He has also pardoning power.

32. *Minnesota.*—Organized as a Territory March 3, 1849. Admitted as a State by act May 4, 1858, taking effect May 11, 1858. Its constitution bears date Aug. 29, 1857. Elections are held on the first Tuesday of November. A voter must be a male citizen of the United States, or one having declared his intention to become such, 21 years of age, 1 year a resident of the United States, 4 months of the State, and 10 days of election district. The legislature meets annually on the first Wednesday of December. The session is limited to 60 days. Senators and representatives must be qualified voters, 1 year residents of the State, and 6 months of the district. Their term is 2 years. Judges are elected by the people. Their term is in supreme court and in district courts 7 years. They may be removed by impeachment. The governor and lieutenant-governor must each be 25 years of age, citizen of the United States, and 1 year *bona fide* resident of the State. The governor's term is 2 years and his salary $3000. His veto may be overruled by two-thirds vote. He has pardoning power.

20. *Mississippi.*—Organized as a Territory April 7, 1798. Admitted as a State Dec. 10, 1817. Its successive constitutions bear date Aug. 15, 1817; Oct. 26, 1832; Dec. 1, 1868. Elections are held on the first Tuesday after the first Monday in November. A voter must be 21 years of age, a citizen of the United States, 6 months resident of the State, and 1 month of the county. The legislature meets biennially on the first Tuesday after the first Monday of January in odd years. A representative must be 25 years of age and an actual resident of the county he represents. A senator must be 25 years of age, 1 year inhabitant of the State and an actual resident of the district he represents. The term of a representative is 2 years, of a senator 4 years. Judges are appointed by the governor, by and with the advice and consent of the Senate. Their term is in the supreme court 9 years, in circuit courts 6 years. They may be removed by impeachment. The governor and lieutenant-governor must each be 30 years of age, 20 years a citizen of the United States, and 2 years a resident of the State. The governor's term is 4 years and his salary $3000. He has veto power, but may be overruled by two-thirds vote. He has also the pardoning power.

24. *Missouri.*—Organized as a Territory June 4, 1812. Admitted as a State by act March 2, 1821, which took effect Aug. 10, 1821. Its successive constitutions bear date July 19, 1820; June 6, 1865; Oct. 30, 1875. Elections are held biennially on the Tuesday next after the first Monday of November. A voter must be a male citizen of the United States, or one having declared his intention to become such, not less than 1 year and not more than 5 years before he offers to vote, 21 years of age, 1 year a resident of the State, and 60 days resident of the county. The legislature meets biennially on the first Wednesday after the first day of January in odd years. Its session is limited to 70 days. A representative must be a male citizen of the United States, 24 years of age, for 2 years a qualified voter of the State, 1 year inhabitant of the county or district, and must have paid a State or county tax within 1 year before election. A senator must be 30 years of age, for 3 years a voter of the State, and must have the other qualifications of a representative. Judges are elected by the people. Their term of office is in supreme court 10 years; in court of appeals 12 years; in circuit courts 6 years. They may be removed by impeachment. The governor and lieutenant-governor must each be 35 years of age, 10 years a citizen of the United States, and 7 years a resident of the State. The governor's term is 4 years and his salary $5000. He has the veto power, but may be overruled by two-thirds vote. He has also pardoning power.

37. *Nebraska.*—Organized as a Territory May 30, 1854. Admitted as a State by act Feb. 9, 1867, taking effect March 1, 1867. Its successive constitutions bear date June 21, 1866; Oct. 12, 1875. Elections are held on Tuesday succeeding first Monday in November. A voter must be 21 years of age, a male citizen of the United States, or one who has declared his intention of becoming such 30 days prior to the election, 6 months a resident of the county. The legislature meets biennially on the first Tue[illegible] of January in odd years. Its session is limited to 40 [illegible]s. Senators and representatives must be electors, and [illegible] have resided within their district 1 year before election. [illegible] in 2 y[illegible] Judges are elected by the people. Th[illegible] preme court 6 years; in district cour[illegible] courts 2 years. They may be r[illegible] the [illegible] The governor and lieutenant-gove[illegible] of age, 2 years a citizen of the Uni[illegible]

State. The governor's term is 2 years and his salary $1000. He has the veto power, but may be overruled by two-thirds vote. He has also pardoning power.

36. *Nevada.*—Organized as a Territory March 2, 1861. Admitted as a State by act March 21, 1864, taking effect Oct. 31, 1864. Its constitution bears date September, 1864. Elections are held biennially on Tuesday next after first Monday in November. A voter must be 21 years of age, a white male citizen of the United States, 6 months resident of the State, and 30 days of the county or district. The legislature meets biennially on the first Monday of January in odd years. Its session is limited to 60 days. Senators and representatives must be duly qualified electors in their respective districts and counties. Their term is 2 years. Judges are elected by the people. Their term is in supreme court 6 years, in district courts 4 years. They may be removed by impeachment. The governor and lieutenant-governor must each be 25 years of age, 2 years resident of the State, and a qualified elector. The governor's term is 4 years and his salary $6000. His veto may be overruled by a two-thirds vote. He has pardoning power.

4. *New Hampshire.*—Ratified the Constitution of the United States June 21, 1788. Its successive constitutions bear date Jan. 5, 1776; June 2, 1784; 1792; 1876. Elections are held biennially on the first Tuesday in November in even years. A voter must be 21 years of age, a male inhabitant of the State, town, and place. The legislature meets biennially on the first Wednesday in June in odd years. A representative must be 21 years of age, 2 years inhabitant of the State, resident of the district, and of the Protestant religion. A senator must be 30 years of age, 7 years inhabitant of the State, and must have the other qualifications of a representative. Judges are appointed by the governor with consent of the council, and hold office during good behavior, but must not be over 70 years of age. They may be removed by the governor with consent of the council. The governor must be 30 years of age, 7 years a resident of the State and of the Protestant religion. His term is 1 year and his salary $1000. He has the veto power, but may be overruled by two-thirds vote. He also exercises the pardoning power with the aid of the executive council.

3. *New Jersey.*—Ratified the Constitution of the United States Dec. 18, 1787. Its successive constitutions bear date July 3, 1776; Aug. 13, 1844. Elections are held on the first Tuesday after the first Monday in November. A voter must be a male citizen of the United States, 21 years of age, 1 year a resident of the State and county. The legislature meets annually on the second Tuesday of January. A representative must be a qualified voter, 21 years of age, 2 years a resident of the State, and 1 year of the county. A senator must be a qualified voter, 30 years of age, 4 years a resident of the State, and 1 year of the county. The term of a representative is 1 year, of a senator 3 years. Judges of the court of errors and appeals and of the supreme court are appointed by the governor with the consent of the senate; judges of the courts of common pleas are appointed by the senate and general assembly. Judges of the court of errors and appeals hold office 6 years; of the supreme court 7 years; of the courts of common pleas 5 years. They may be removed by impeachment. The governor must be 30 years of age, 20 years a citizen of the United States, 7 years a resident of the State. His term is 3 years and his salary $5000. His veto may be overruled by a majority of the house in which the bill originated. Pardons are granted by the governor, the chancellor and the six judges of the court of errors and appeals.

5. *New York.*—Ratified the Constitution of the United States July 26, 1788. Its successive constitutions bear date April 20, 1777; February, 1822; November, 1846. Elections are held on Tuesday after the first Monday in November. A voter must be a male citizen, 21 years of age, 1 year resident of the State, 4 months of county, 30 days of district, and 10 days a citizen. The legislature meets annually on the first Tuesday in January. "No person shall be eligible to the legislature who at the time of his election, or within 100 days previous thereto, has been a member of Congress, a civil or military officer under the United States, or an officer under any city government." The term of a representative is 1 year, of a senator 2 years. Judges are elected by the people. Their term is in the court of appeals and supreme court 14 years (but not after the age of 70 years), in county courts 6 years. They may be removed by resolution of both houses of the legislature, two-thirds of the members concurring. The governor and lieutenant-governor must each be 30 years of age, a citizen of the United States, and 5 years a resident of the State. The governor's term is 3 years and his salary $10,000. His veto may be overruled by two-thirds vote. He has pardoning power.

7. *North Carolina.*—Ratified the Constitution of the United States Nov. 21, 1789. Its successive constitutions bear date Dec. 18, 1776; March 16, 1868; Oct. 12, 1875. Elections are held on the first Tuesday of November. A voter must be a male person born in the United States or naturalized, 21 years of age, 12 months a resident of the State, and 90 days of the county. The legislature meets biennially on the first Wednesday after the first Monday in January in odd years. Its session is limited to 60 days. A representative must be a qualified elector and 1 year a resident of the county. A senator must be 25 years of age, 2 years a resident and citizen of the State, and 1 year of his district. The term of senators and representatives is 2 years. Judges are elected by joint ballot in the two houses of assembly. Their term is 8 years, but they may be removed upon a concurrent resolution of two-thirds of both houses of the general assembly. The governor and lieutenant-governor must each be 30 years of age, 5 years a citizen of the United States, 2 years a resident of the State. The governor's term is 4 years and his salary $5000. He has veto and pardoning power, and is assisted by a council.

17. *Ohio.*—Erected into a Territory by the ordinance of 1787. Admitted as a State by act of April 30, 1802, which took effect Nov. 29, 1802. Its successive constitutions bear date Nov. 29, 1803; March 10, 1851. Elections are held on the second Tuesday of October. A voter must be a white male citizen of the United States, 21 years of age, and 1 year resident of State and county. The legislature meets biennially on the first Monday of January in odd years. Senators and representatives must have been residents of their respective districts or counties 1 year preceding their election. Their term is 2 years. Judges are elected by the people. Their term is 5 years. They may be removed by a concurrent resolution of both houses of the general assembly, two-thirds of the members concurring. The governor and lieutenant-governor must possess the qualifications of an elector. The governor's term is 2 years and his salary is $4000. He has pardoning power.

33. *Oregon.*—Organized as a Territory Aug. 14, 1848. Admitted as a State Feb. 14, 1859. Its constitution bears date Nov. 9, 1857. Elections are held biennially on the first Monday of June in even years. A voter must be a white male citizen of the United States, 21 years of age, 6 months resident of the State. The legislature meets biennially on the second Monday of September in even years. Its session is limited to 40 days. Senators and representatives must be citizens of the United States, 21 years of age, 1 year inhabitants of district or county. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is in supreme court and in circuit courts 6 years, in county courts 4 years. They may be removed by the governor on the joint resolution of the legislative assembly, in which two-thirds of its members concur. The governor must be 30 years of age, a citizen of the United States, 3 years a resident of the State. His term is 4 years and his salary $1500. His veto may be overruled by two-thirds vote. He has pardoning power.

10. *Pennsylvania.*—Ratified the Constitution of the United States Dec. 13, 1787. Its successive constitutions bear date Sept. 28, 1776; Aug. 9, 1790; Feb. 22, 1838; Dec. 16, 1873. Elections are held on Tuesday next following the first Monday of November. A voter must be 21 years of age, 1 month a citizen of the United States, 1 year a resident of the State, 2 months a resident of the district, and must have paid within 2 years a State or county tax 1 month before the election. The legislature meets biennially on the first Tuesday of January in odd years. Its session is limited to 150 days. A representative must be 21 years of age, 4 years a citizen and inhabitant of the State, 1 year an inhabitant of the district, and resident of it during term of service. A

senator must be 25 years of age, and must have all the other qualifications of a representative. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is in the supreme court 21 years, in the court of common pleas 10 years. They may be removed by the governor on the address of two-thirds of the senate. The governor and lieutenant-governor must each be a citizen of the United States, 30 years of age, and 7 years inhabitant of the State. The governor's term is 4 years and his salary $10,000. His veto may be overruled by two-thirds vote. He grants pardons on recommendation of board of pardons.

11. *Rhode Island.*—Ratified the Constitution of the United States May 29, 1790. As a State it remained under the colonial charter of 1663 until its present constitution was adopted, bearing date Nov. 23, 1842, and taking effect May 2, 1843. Elections are held on the first Tuesday in November. A voter must be a male citizen of the United States, 21 years of age, 1 year resident of the State, and 6 months of the district; he must possess real estate to the value of $134, and must have paid his taxes. The legislature meets annually on the last Tuesday in May. Senators and representatives must be qualified electors. Their term is 1 year. Judges are elected by the legislature and hold their office until it be declared vacant by the legislature, or they may be removed by impeachment. The governor must be a qualified elector. His term is 1 year and his salary is $1000. His veto may be overruled by two-thirds vote. He has pardoning power.

12. *South Carolina.*—Ratified the Constitution of the United States May 23, 1788. Its successive constitutions bear date March 26, 1776; March 19, 1778; June 3, 1790; Sept. 27, 1865; April 16, 1868. Elections are held biennially on the first Tuesday following the first Monday of November in even years. A voter must be a male citizen of the United States, 21 years of age, 1 year resident of the State, and 60 days of the county. The legislature meets annually on the fourth Tuesday of November. A representative must be 21 years of age, a citizen of the United States, 1 year resident of the State, and 3 months of county. A senator must be 25 years of age, and have the other qualifications of a representative. The term of a representative is 2 years, of a senator 4 years. Judges are appointed by the general assembly. Their term is in the supreme court 6 years, in circuit courts 2 years. They may be removed by the governor on the address of two-thirds of each house of the general assembly. The governor and lieutenant-governor must each be 30 years of age, 2 years a citizen of the United States, and a citizen and resident of the State, and must believe in the existence of a Supreme Being. The governor's term is 2 years and his salary $4000. His veto may be overruled by a two-thirds vote. He has pardoning power.

16. *Tennessee.*—Formed out of North Carolina and admitted as a State June 1, 1796. Its successive constitutions bear date Feb. 6, 1796; March 6, 1835; March 26, 1870. Elections are held biennially on the first Tuesday after the first Monday in November of even years. A voter must be a male citizen of the United States, 21 years of age, 12 months resident of the State and 6 months of county or district, and must have paid poll-tax. The legislature meets biennially on the first Monday in January in odd years. Its session is limited to 75 days. A representative must be a citizen of the United States, 21 years of age, 3 years resident of the State and 1 year of the county. A senator must be 30 years of age and have the other qualifications of a representative. The term of senators and representatives is 2 years. Judges are elected by the people. Their term is 8 years. They may be removed by a concurrent vote of both houses of the general assembly, two-thirds of the members concurring in such vote. The governor must be 30 years of age, citizen of the United States and 7 years citizen of the State. His term is 2 years and his salary $3000. His veto may be overruled by a majority vote of all the members of both houses. He has pardoning power.

29. *Texas.*—Formerly belonging to Mexico, declared its independence March 2, 1836, was annexed to the United States by act of March 1, 1845, and admitted as a State Dec. 29, 1845. Its successive constitutions bear date Oct. 13, 1845; June 25, 1866; Dec. 3, 1869; Feb. 17, 1876. Elections are held biennially on the first Tuesday of November of even years. A voter must be a male person, 21 years of age, a citizen of the United States, 1 year a resident of the State and 6 months of the district or county. The legislature meets biennially on the second Tuesday of January in odd years. A representative must be a qualified elector of the State, 2 years resident of the State, and 1 year of his district. A senator must be 26 years of age, 5 years resident of the State, and 1 year of his district. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is in supreme court and in court of appeals 6 years, in district courts 4 years. They may be removed by impeachment. The governor and lieutenant-governor must be 30 years of age, a citizen of the United States, and 5 years resident of the State. The governor's term is 2 years and his salary $5000. His veto may be overruled by two-thirds vote. He has pardoning power.

15. *Vermont.*—Formed out of New Hampshire and New York. Admitted as a State by act of Feb. 18, 1791, taking effect March 4, 1791. Its successive constitutions bear date July 8, 1777; March, 1787; Nov. 2, 1796. Elections are held biennially on the first Tuesday of September in even years. A voter must be a male, 21 years of age, 1 year resident of the State. The legislature meets biennially on the first Wednesday of October in even years. A representative must be a freeman, 2 years resident of the State and 1 year of the county. A senator must be 30 years of age and a freeman of the county for which he is elected. The term of senators and representatives is 2 years. Judges are elected by the legislature. Their term is 2 years. They may be removed by impeachment. The governor and lieutenant-governor must each be 4 years resident of the State. The governor's term is 2 years and his salary $1000. His veto may be overruled by a majority vote. He grants pardons with consent of the executive council.

1. *Virginia.*—Ratified the constitution of the United States June 26, 1788. Its successive constitutions bear date June 29, 1776; Jan. 14, 1830; Aug. 1, 1851; April 11, 1864; July 6, 1869. Elections are held biennially on the first Tuesday after the first Monday of November in odd years. A voter must be a citizen of the United States, 21 years of age, 12 months a resident of the State and 3 months of the county, having paid capitation tax. The legislature meets biennially on the first Monday of December in odd years. Its session is limited to 90 days. Senators and representatives must be qualified voters of the district. The term of a representative is 2 years and of a senator 4 years. Judges are chosen by the joint vote of the general assembly. Their term is in supreme court 12 years, in circuit courts 8 years, in county courts 6 years. They may be removed by impeachment. The governor and lieutenant-governor must each be a citizen of the United States, 30 years of age, 5 years a citizen of the State; if of foreign birth he must have been a citizen of the United States for 10 years next preceding his election. The governor's term is 4 years and his salary $5000. His veto may be overruled by two-thirds vote. He has pardoning power.

35. *West Virginia.*—Formed out of Virginia; admitted as a State by act of Dec. 31, 1862, taking effect June 19, 1863. Its successive constitutions bear date April 3, 1863; Aug. 22, 1872. Elections are held biennially on the second Tuesday of October in even years. A voter must be a male citizen of the State, 1 year resident of the State, and 60 days of the county. The legislature meets biennially on the second Wednesday of January. Senators and representatives must have been residents of their district 1 year. The term of a representative is 2 years, of a senator 4 years. Judges are elected by the people. Their term is in supreme court 12 years, in circuit court 8 years. They may be removed by a concurrent two-thirds vote of both houses of the legislature. The governor's term is 4 years and his salary $2700. His veto may be overruled by a majority vote. He has pardoning power.

30. *Wisconsin.*—Organized as a Territory April 20, 1836. Admitted as a State by act of March 3, 1847, which took effect May 29, 1848. Its constitution bears date March, 1848. Elections are held on the first Tuesday after the first Monday of November. A voter must be a white male citizen of the United States, or one who has declared his intention to become such, 21 years of age, and 1 year a resident of the State. The legislature meets on the second Wednesday of January. Senators and representatives must be qualified electors in the district which they are chosen.

represent. The term of a representative is 1 year, of a senator 2 years. Judges are elected by the people. Their term is in supreme court 10 years, in circuit court 6 years. The governor and lieutenant-governor must each be a citizen of the United States, and a qualified elector. The governor's term is 2 years and his salary $5000. His veto may be overruled by a two-thirds vote. He has pardoning power.

39. *South Dakota.*—Admitted as a State November 3, 1889. Constitution adopted May 14, 1889. Elections are held biennially on the Tuesday after the first Monday in November of even years. A voter must be a male citizen of the United States, or a foreigner who has taken steps to become a citizen, 21 years of age, 1 year a resident of the United States, 6 months of the State, 30 days of the county, and 10 days of the precinct. Women may vote at school elections and hold any office not otherwise provided for in the Constitution. The Legislature meets biennially on the Tuesday after the first Monday in January of odd years. Session limited to 60 days. The terms of all members are 2 years. The governor is elected for 2 years. His veto may be set aside by a two-thirds vote. He may veto separate items in appropriation bills. The manufacture and sale of liquors is prohibited.

40. *North Dakota.*—Admitted as a State November 3, 1889. Constitution adopted by popular vote October 1, 1889. Elections held biennially in even years on the Tuesday after the first Monday in November. A voter must be a male citizen of the United States, an alien who has declared intention to become a citizen, or a civilized Indian, and have resided 1 year in the State. Women may vote at school elections and hold school offices. All elections must be held by secret ballot. Senators are elected for 4, representatives for 2 years. The Legislature meets biennially on the Tuesday after the first Monday in January in odd years. Length of session limited to 60 days. The term of the governor is 2 years. He has the pardoning and veto power, and may veto separate items in an appropriation bill. The manufacture and sale of liquors is prohibited. The State debt is limited.

41. *Montana.*—Organized as a Territory May 26, 1864. Admitted as a State November 8, 1889. Constitution adopted October 1, 1889. Elections held biennially in even years on the Tuesday after the first Monday in November. Voters must be male citizens of the United States, 21 years of age, resident for 1 year in the State. Women may vote at school elections. The Legislature meets biennially on the first Monday of January in odd years, its sessions being limited to 60 days. Senators are elected for 4 years, representatives for 2 years. The governor's term is 4 years. He has veto power, and may veto separate sections of an appropriation bill. Trusts are forbidden. A State census is to be taken in 1895, and every 10 years afterwards.

42. *Washington.*—Organized as a Territory in 1853. Admitted as a State November 11, 1889. Constitution adopted October 1, 1889. Elections biennially on the first Monday in November of even years. Voters must be male citizens of the United States, 21 years old, and have lived 1 year in the State. The ballot is to be absolutely secret. The Legislature meets biennially on the first Monday in January in odd years, the sessions being limited to 60 days. The term of senators is 4 years, of representatives 2 years. The governor's term is 4 years, his salary is $6000. He may veto separate sections of any bill. Ownership of lands by aliens is prohibited. The State debt is limited to $400,000. A verdict by 9 jurors is recognised.

43. *Idaho.*—Organized as a Territory March 3, 1863. Admitted as a State July 3, 1890. Constitutional convention held July 4, 1889, and the constitution adopted by popular vote November 2, 1889. Elections biennial on the Tuesday after the first Monday in November of even years. Voters must reside 6 months in State and 30 days in county, and must be male citizens of the United States of 21 years of age. Women may vote at school elections. Absolute secrecy of the ballot is enjoined. Mormons cannot vote or hold office. The Legislature meets biennially on the Tuesday after the first Monday in January of odd years. The term of senators, representatives, and governor is 2 years. The governor has veto power, and can veto separate items in an appropriation bill. In civil suits three-fourths of a jury may give a verdict. No religious doctrine shall be taught in the public schools. Eight hours is a legal day on public works. The employment of children under 14 years in mines is prohibited.

44. *Wyoming.*—Organized as a Territory in the year 1868. Admitted as a State July 11, 1890. Constitution adopted by popular vote November 3, 1889. Elections held biennially on the Tuesday after the first Monday in November in even years. Women have right of suffrage. Voters must have resided 6 months in the State. The ballot is to be absolutely secret. The Legislature meets biennially on the second Tuesday of January in odd years. The session is limited to 40 days. The term of a senator is 4 years, of a representative 2 years. The governor's term is 4 years. He has the pardoning and veto power, and may veto separate items in appropriation bills. Eight hours is a legal day on public works.

CONSULS. Consuls are divided, according to the *United States Consular Regulations*, into the following classes: Consuls-general, vice-consuls-general, consuls, vice-consuls, deputy consuls, consular agents, commercial agents, vice commercial agents, consular clerks, and office clerks. Deputy consuls, etc. exercise the same powers as their superiors within a limited territory, while vice-consuls, etc. are appointed to fill temporary vacancies. A class of consular pupils is recognized by a treaty between France and the United States, which provides that they shall have the same privileges and immunities of the person as consuls. "Commercial agents" are peculiar to the United States service, probably from considerations of convenience in their appointment or recognition. A consul must receive, in addition to his commission from the appointing government, a permission to act from the nation of his residence. This permission is commonly in the form of an *exequatur*, which consists of letters patent signed by the chief executive of the nation and countersigned by the minister for foreign affairs. In Russia and Denmark the *exequatur* is not used, and the consul simply receives notice of his recognition. In Austria *exequatur* is written in the commission, accompanied by the imperial seal. By treaties between the United States and Italy, Denmark, Belgium, France, and New Granada, the *exequatur* is required to be issued free of charge; but England, Spain, and some other countries require the payment of charges ranging from about $8 to $90.

See Vol. VI. p. 280 Am. ed. (p. 315 Edin. ed.).

A nation may appoint consuls in such ports and cities of another nation as are desirable, although consular conventions usually specify the places where these officers may be maintained. A consul's powers extend to a great variety of matters, including marriages, desertions, wrecks, administration of estates, adjustment of average, shipping interests, judicial proceedings affecting members of the nation he represents, and protection (when appealed to) of the persons and property of foreigners generally. A consul may take affidavits and depositions affecting members of his nation; authenticate contracts, wills, protests, declarations, etc.; and execute commissions issued from the courts of his nation. For the protection of the rights and redress of the wrongs of the members of his nation a consul may appeal to the judicial or other authorities in his district.

The immunities of consular officers, as a rule, are only such as are necessary to the proper administration of their functions. A consul is entitled to immunity from military occupation of his dwelling, from military and naval service, and from jury and other civil service. If he is not engaged in commerce, he is exempt from arrest on civil process. A consul is subject to arrest in criminal cases, but a distinction is made sometimes between offences which are "crimes" and those that are "misdemeanors" according to the local law. Treaties be-

tween the United States and France and Italy permit arrest only in case of "crimes." (A. P. S.)

CONTEMPT.—Every defiance or disobedience of constituted authority, every insult to it, every act in derogation of it, involves a contempt of that authority. Under the system of law prevailing in England, and in this country, such acts, with respect to legislative bodies and courts, have come to be known as "contempts." Anything intended to obstruct justice, or which will have that effect, may be punished as a contempt by the court before which the proceedings are had. "Contempt is a wilful disregard or disobedience of a public authority;" it is also defined as "a disobedience to the rules and orders of a court which hath power to punish such offence."

See Vol. VI. p. 283 Am. ed. (p. 318 Edin. ed.).

Contempts are punishable by fine and imprisonment, and anciently in England by a corporal or infamous punishment, but no instance of this latter sort has occurred in this country. There is a difference in the kind and degree of punishment which may be imposed by different courts: the punishment in the power of legislative bodies is imprisonment only, which must terminate at the end of the session, since then such bodies are dissolved. If a fine be not paid the party may be committed to prison; he is then in the position of one convicted of a criminal offence, and this is true of any commitment for contempt. It has been held that a court of the United States which has committed a prisoner for contempt cannot discharge him on the ground of his inability to pay, his offence being one against the United States and subject to the pardoning power of the President alone. In many States there are statutory provisions for the discharge of criminals unable to pay their fines.

Contempts in the presence of the court it will of its own motion notice and punish summarily; those elsewhere committed must be brought to its knowledge by information, generally on affidavits, when a summons is issued to the offender to appear and answer, or to show cause why an attachment, that is, a warrant of arrest, should not issue against him. In flagrant cases an attachment issues in the first instance. Some cases of constructive contempts, as those by publication, for instance, the court will of its own motion notice and punish. To award an attachment is entirely in the discretion of the judge, and he may do so on his own knowledge or on a bare suggestion. The object of an attachment is only to bring up the offender for a hearing that he may answer on oath in regard to his alleged contempt; it is indispensable that he be arrested or summoned, except in cases of contempt in the presence of the court, on which, as said, the court will take action at once.

Persons guilty of contempt may be arrested whenever found within the jurisdiction of the court, even though the contempt were committed outside of such jurisdiction. The accused may clear himself on oath of the alleged contempt; that is, in technical language, he may purge the contempt; but if he commit perjury in so doing he may be prosecuted therefor. The contempt may also be purged by the submission of the offender; but although he may excuse himself on the ground of innocence of intention, where the words or the act were at all doubtful, or admitted of more than one interpretation, the nature of the words or the act will be chiefly regarded, and if plainly insulting or defiant, an avowal of innocence will not justify, although to some extent it may mitigate, the offence.

It has been questioned whether the summary punishment for contempt is an infringement of the provision in the various State constitutions guaranteeing to the citizen a trial by jury, but wherever this point has been passed on by the courts they have, without exception, decided that it is not. Nor will the privilege of a member of Parliament in England protect him in the commission of a criminal contempt, as, for instance, carrying off a ward of chancery, and refusing to inform the court of her whereabouts. A barrister and member of Parliament wrote an insulting and threatening letter to a master in chancery: the lord chancellor ordered him to be committed to prison. He evaded arrest until Parliament met, and the House of Commons then decided that his privilege did not protect him. In the celebrated Tichborne case a member of Parliament was committed to prison for making public speeches abusing the lord chief-justice; it was held a gross contempt.

The power of punishing contempts is necessary to self-preservation of a court or a legislative body. How could any assemblage make laws which could not, when convened, establish and maintain, as its own first law, order, and protect itself from insult? How could any court sustain its dignity and enforce its decrees if it could not instantly repress insolence and violence offered it or its ministers, and punish disobedience? Before the English and Roman kings, and the Roman emperors, the embodiments of power and justice, or the chosen citizens on whom were bestowed judicial functions, the representatives of the power of the whole community, any irreverence, any disobedience, was nothing less than a crime, and the devolution on others of this exercise of these functions has carried with it this attribute. To the English Houses of Parliament and to superior courts pertains a power commensurate with their rank; descending in the scale it diminishes, the inferior courts and legislative assemblies having only such as enables them to preserve their existence and perform their functions. The category of contempts which may be committed against these supreme depositaries of power and justice embraces everything which can be defined as such. Of course there cannot arise, in regard to legislative assemblies, so many contingencies in which contempts are possible as occur in the course of the administration of justice by courts. These supreme depositaries are also empowered to inflict the maximum penalty known for offences of this description, and they are, moreover, in all cases where their jurisdiction exists, the sole judges as respects their exercise of this power, free of any interference or control whatever, nor are their decisions subject to review by any other authority. A very celebrated and leading case on this subject is that of Brass Crosby, Lord Mayor of London (3 *Wilson Rep.*, 188, A.D. 1771). Brass Crosby had been committed by the House of Commons to the Tower for contempt in signing a warrant for the arrest of the messenger of the House and holding him to bail. A writ of habeas corpus had been issued on his behalf from the Common Pleas, and he was brought up into court; but, on hearing the cause of his imprisonment, he was remanded, the court refusing to release him, on the ground that no court would interfere with a commitment for contempt by a superior court.

This case has its parallel in that of *Ex parte* Nugent (1 *Am. L. J.* (*N. S.*), 107). This was a petition for a habeas corpus for one committed for contempt before the Senate of the United States in secret session. The writ was d by the United States

District Court in the District of Columbia, and Cranch, C. J., cited Judge Story as declaring that the Lord Mayor's Case had settled the law, which had so continued down to the present day, and, accordingly, the prisoner was remanded. Although the Lord Mayor's Case was a contempt to the House of Commons, the decision fully sustains the general principles as given above: in the opinion of Blackstone, J., the Courts of Westminster Hall are mentioned with the Houses of Parliament, and the same rule laid down for all. To this rule, which is much earlier than the Lord Mayor's Case, there is scarcely any exception. A very noted case, which may be considered to establish the exception to the rule, is Bushel's Case (*Vaughan's Rep.*, 135, A.D. 1682). The Court of Oyer and Terminer, a superior court, had committed for contempt a jury which, on a trial in that court, had acquitted the accused, against the direction of the court, and against the law and the evidence (so stated in the order of the court committing them), for which they were fined, and on non-payment of the fine imprisoned. This action of the court was grossly unconstitutional, and when the jurymen were brought up on habeas corpus in the Common Pleas they were discharged; Chief-Justice Vaughan setting forth most clearly and forcibly that the action of the jury in acquitting was no cause of fine and imprisonment.

This case stands alone, but should its like ever arise again, either in England or the United States, it is hardly possible that any court before which such commitment should be brought for examination could do otherwise than follow the course indicated by Lord Ellenborough in his opinion in Burdett *vs.* Abbott (14 *East. Rep.*, 150), in which Bushel's Case had been cited, where he said: "If a commitment appeared to be for a contempt of the House of Commons generally, I would neither in the case of that court, or of any other of the superior courts, inquire further; but if it did not profess to commit for contempt, but for some matter appearing on the return, which could by no reasonable intendment be considered as a contempt of the court committing, but a ground of commitment palpably and evidently arbitrary, unjust, and contrary to every principle of positive law or national justice, I say, in the case of such commitment if it should ever occur, but which I cannot possibly anticipate as ever likely to occur, we must look at it and act upon it as justice may require from whatever court it may profess to have proceeded."

The doctrine we are discussing is well established in England. In the United States it has been adopted in the main by the Federal courts, and those of New York, Vermont, Kentucky, Iowa, Texas, Mississippi, Alabama, Arkansas, and Connecticut. In some of the other States of the Union a different view is entertained; this we will now proceed to examine. Although not universally held in this country, we have denominated the newer views entertained in opposition to those of the English courts, by the courts of some of the States, as the American doctrine, because it originated here, and has in some States supplanted the older doctrine. Why this divergence of opinion first arose, though the causes may not all be apparent, will be somewhat better understood if we advert for a moment to the difference between the English system of courts and that of this country.

The Court of King's Bench in England, being held by fiction of law before the King in person, had precedence of all other courts (strictly so called) in the kingdom, but the other Courts of Westminster Hall were of nearly equal dignity. These courts were the Court of Common Pleas, Exchequer, and the Court of Chancery. In Bacon's *Abridgement* (Courts D.), we are told that Parliament, consisting of King, Lords, and Commons, is the supreme court of the kingdom. Each of the two houses is also a court of judicature. The power of the Houses of Parliament and all these courts over contempt was necessarily independent of all revision or control of any other authority; and this independence of control resulted from the high dignity of the Houses of Parliament and the courts specified, and was established with reference to them. This very clearly appears on examination of Sir William Blackstone's opinion in the Lord Mayor's case. No such order of courts ever existed in the United States. In each State was organized one, or, where a separate equity system was established, two courts of appeal and last resort, which took the place of the King's Bench and Court of Chancery in England, and exercised superintendence over all other courts. Thus the highest courts being much fewer in number in each State, one very strong reason was wanting for the establishment of the English rule. It seemed better that the highest court of a State should exercise a general superintending jurisdiction over all others, the more so that a contempt was a criminal offence. While it was recognized that many of the courts thus controlled were superior courts, they were still subordinate courts. In some States a distinction has been recognized between the control which a court should have over its officers, allowing a greater latitude in punishing their contempts than those committed by others. Accordingly, on appeal or writ of error, or a certiorari, or a writ of habeas corpus, the highest courts in various States will examine a commitment for contempt by another court of an inferior degree to see—1st, that the committing court did not transcend its jurisdiction; 2d, that its proceedings were formal and regular; 3d, in some cases the inquiry has even been carried farther and the nature of the act considered, whether or not it constituted a contempt. Substantially these views prevail in Pennsylvania, Indiana, Illinois, Tennessee, North and South Carolina, Georgia, Kansas, Michigan, and Wisconsin. Of these States some originally adhered to the stricter doctrine of the English courts. In some States the change has been gradually brought about by decisions of the courts; in others a sudden and radical alteration has been made by statute.

Hitherto we have spoken only of the examination of a commitment for contempt by another court of the same State. Manifestly it is impossible that such examination should be made by a court of another State—that is, by a court of a different sovereignty; the question can only arise within one and the same jurisdiction. But within the boundaries of every State the United States have also jurisdiction, and the inquiry naturally arises, what is the attitude of the Federal and State courts towards each other in this matter. But one case where the question arose is recorded, that of Passmore Williamson in 1855, 26 *Penn. State Rep.*, 9. Williamson had been committed by the United States District Court for the Eastern District of Pennsylvania for contempt in disobeying its order to produce certain slaves whom he had aided in carrying away from their owner. Application was made to the Supreme Court of Pennsylvania for a writ of *habeas corpus* in his behalf. The court refused

the application on the ground that the commitment was by an independent co-ordinate court, belonging to a different judicial system, and that the doctrine of the Lord Mayor's Case applied to the fullest extent. Had the commitment been by a court of the State the decision would have been different. Thus a conflict of jurisdiction was perhaps avoided.

Notwithstanding the divergence of views above stated, the difference between the English doctrine and that which is gaining ground in the United States is more apparent than real, greater in *practice* than in *principle;* in truth the American doctrine is founded on a logical development of principles underlying all law and justice, and which have been unmistakably declared in a number of cases, old and recent, very notably in Bushel's Case and Burdett *vs.* Abbott above adverted to.

Even with regard to commitments of the House of Commons the Court of Queen's Bench declared in Stockdale *vs.* Hansard (9 *Ad. & Ell.*, 1, 1839) that it had power to examine into the alleged privilege of the House (which was set out in the plea), to ascertain if it were truly such; that is, to pass on the question of the jurisdiction of the House of Commons in punishing for the alleged contempt. A similar decision as to the power of the Massachusetts House of Representatives was made in Burnham *vs.* Morrissey (14 *Gray*, 226, 1859). The principle must be borne in mind that where the warrant of commitment of a superior court states no ground of commitment, but alleges generally contempt, this cannot be inquired into. In view of recent decisions, both in England and this country, it may be doubted if this holds good as regards legislative contempts other than those to a House of Parliament.

The law in New York adheres to the stricter view as regards the power of review of sentences for contempt, but in People *ex rel. vs.* Kelly in 1861 (24 *N. Y. Rep.*, 74; 1 *Am. Law Reg.* (N. S.), 534) it was declared that the act charged as a contempt must be such that some degree of delinquency can be fixed on it, if indifferent or proper it cannot constitute a criminal contempt; and if the alleged contempt was only the assertion of a constitutional right, the imprisonment for contempt would be held illegal. In a note to the report of this case Prof. Theodore Dwight argues that the principle of the Lord Mayor's Case does not apply to such cases as this, in which the propriety of a conviction for contempt should be examinable in some way to prevent a failure of justice. This principle should govern only where the commitment is for contempt generally. If the ground of the adjudication appeared on the face of the return, and was plainly bad, the prisoner should be discharged. He cites the opinion of Lord Ellenborough in Burdett *vs.* Abbott, and the very similar case of Burnham *vs.* Morrissey, which fully sustain his views.

This discussion and comparison of the English and American doctrines will now enable us to state briefly the distinction between them. According to the first the jurisdiction of superior courts and the formality and regularity of their proceedings in matters of contempt are presumed, and will not be elsewhere examined, where a commitment by such courts is brought in question; but if want of jurisdiction, lack of proper formality, or gross illegality, be apparent on the face of the proceedings, as they come before the judicial body which scrutinizes them, then such commitment must be declared invalid, and the person under sentence for contempt relieved from such penalty. Where the contrary doctrine governs the same causes would bring about the like result, but if such causes did not appear on the face of the proceedings, the court called on to take cognizance of such commitment would examine and decide whether there were found those requisites of jurisdiction and regularity of proceedings, and where this view is most strongly held, even what was the act complained of, and if it constituted a contempt.

Where the English doctrine prevails there is no other remedy than the very limited power of revision recognized by it for any error, injustice, abuse of discretion, oppressive or corrupt conduct on the part of a judge of a superior court, except by an impeachment before the legislature, or in England an address to the crown, asking the removal of the judge. A number of such cases are found in our annals. That of the judges of the Supreme Court of Pennsylvania in 1807 (which at that date adhered strongly to the English doctrine), though resulting in their acquittal, led to the passage of the act of 1809, limiting the power of the courts over contempts. The victim of legislative tyranny exercised in this manner, except in so far as he can hold accountable its officers and agents, has no redress. The act is that of the whole body, and it is practically irresponsible.

In England inferior courts are usually, in the United States always, courts not of record. To this class in England belonged various private and local courts, many of which have long been obsolete, such as the market court, the court leet. Here must be classed many statutory courts created with limited powers. All these are courts of partial jurisdiction. In the United States courts of justices of the peace, and other similar magistrates, are usually of this class; also such as the surrogate's court in New York, and the court of probate in Massachusetts.

The jurisdiction of this class of cou[illegible] s] sumed, but must be shown; the same regularity and formality of their pr[illegible] warrant or order of commitment must facts and circumstances of the contempt. of all such courts is limited to direct con[illegible] mitted in their actual presence, [illegible] amination and control by the hig[illegible] they had jurisdiction, and their pr[illegible] ular and lawful. In England, and can cases, it has been determined court will not go further and ex[illegible] the case to see if a contempt ha[illegible] by any fair intendment the facts or wo[illegible] constitute contempt. In others of the [illegible] however, reviewing courts have act complained of and passed judg[illegible] respect to commitments for cont[illegible] courts, and so likewise in case of c[illegible] courts. But it is a principle of that no court will punish or take [illegible] to another court.

The English Houses of Parli[illegible] courts, the highest in the ki[illegible] theoretically, remain such to t[illegible] cisions relative to the powers o[illegible] specting contempts are of force w[illegible] But no similar state of any other legislative asse[illegible] colonies or depende[illegible] springs a distinction be[illegible]

the Houses of Parliament as regards the foundations on which rests their power over contempts. The early cases in the Federal Courts in which commitments for contempt by either House of Congress were brought under examination seem not to have recognized this distinction, nor to have noticed the historical facts which gave rise to it. In Kilbourn *vs.* Thompson (A. D. 1880, 13 *Otto*, 168) it is very clearly set forth, and the similarity declared in former decisions of the Supreme Court of the United States to exist between the powers of Parliament and Congress entirely repudiated. The exercise of this power by either House of Congress is said not to be supported by the possession of any judicial attributes, nor is any warrant for it found in the history of Congress; it rests solely on the provisions of the instrument by which Congress was created, viz., the Constitution of the United States. The Supreme Court, however, expressly disclaimed deciding how far the power might be implied as necessary to the proper performance of the legislative function.

The principle laid down in this case may be safely assumed to be of force in regard to all legislative bodies in this country, though but one other case is found where the question arose, viz., Burnham *vs.* Morrissey, before mentioned. In this case the power of the Massachusetts Assembly to punish for contempt came under examination by the Supreme Court of the State. The views of the court were in accord with those subsequently pronounced in Kilbourn *vs.* Thompson. Further, it was said that under a written constitution it belongs to the judicial department to determine ther the powers of the legislature have been exerd in conformity with the constitution, and, if not, ... treat their acts as null and void. Their power er contempt is limited to cases specially provided for the State constitution, or necessarily implied from se constitutional functions and duties to whose perince it is absolutely necessary. It is worthy of hat the Constitution of Massachusetts provides contempt to a house of the legislature may be punished by a definite term of imprisonment extending beyond its session. This is an exception to the parliamentary law of contempt.

As all legislative bodies in the United States are created by positive law, that is, by the constitutions of the several States, in which their powers are laid down and defined, we must look to their organic law to ascertain the nature and extent of their power to punish contempts. It must be derived from this source alone, except in so far as it may be necessary to enable such bodies to carry out the objects for which they were instituted.

In England these principles are now fully recognized, although a contrary view, the same which until recently prevailed in this country, was advanced. This doctrine, which was formerly that of the Supreme Court of the United States, attributes to every supreme legislative body, such as Congress and the State Legislatures, the inherent power of punishing contempts, as implied in their very nature.

But the English courts latterly repudiated this opinion, and drew a distinction between the powers of either House of Parliament, which depend on the *lex* (*uetudo parliamenti* and those of a colonial of Assembly, such as those of Dominica and ... land. These have no judicial functions like E. of Lords, nor any privileges by ancient ... ription like the House of Commons. They are regulated by their charters and have only the authority necessary to their existence and the proper exercise of their functions.

To remove obstructions to the transaction of their business, to expel disorderly members, would seem to be included among these powers, but not to imprison for contempts, which is a judicial power, nor *à fortiori* without an express grant to punish for contempts committed out of their presence. They have no inherent power to commit for contempt.

At the present day the spirit of the law tends entirely toward restriction of the power of punishing contempt. In England the alteration has been made by direct enactment, but recent decisions of the courts manifest a disapproval of the system of punishment for contempt before unknown there. As early as the case of Stockdale *vs.* Hansard (9 *Ad. & Ellis*, 1, 1839) the Court of King's Bench asserted their right to inquire into the alleged privileges of the House of Commons, whose violation was the ground of commitment for contempt by the house; and in a recent case it was observed that the jurisdiction of committing for contempt being practically arbitrary and unlimited, should be jealously watched and not exercised except where there is no other remedy not liable to the same objection. Elsewhere it is said to be of a high and peculiar character, in derogation of the liberty of the subject, and displaying the anomaly of constituting those who exercise it judges in their own cause, and judges from whom there is no appeal.

In the United States a far wider innovation has been effected, and in very many States constitutional and statutory changes and limitations have been made in this branch of the law. The effect of such changes has been to narrow the definition of the offence, diminish the number of persons to whom it can be imputed, and restrict the punishment of it by the courts. This is very noticeably the case as to constructive contempts, which in the United States may be said to be in the main abrogated. An inquiry into the nature and extent of alterations thus effected requires a more detailed examination of the laws of the United States and the constitutions and laws of the various States.

Judicial decisions manifest the same disposition. The power has been declared to be arbitrary in its nature, to be an exception to the provisions of the Constitution of the United States, and one which should not be extended beyond statutory limits. A commitment until further order of the court has been characterized as not consorting with our free institutions. We cannot better sum up our discussion of this branch of the subject than in the language of the Supreme Court of the United States in the case of Kilbourn *vs.* Thompson: "The tendency of modern decisions everywhere is to the doctrine that the jurisdiction of a court or other tribunal to render a judgment affecting individual rights is always open to inquiry, when the judgment is relied on in any other proceeding." (For further details See *American Law Register*, Feb. to July, 1881.) (C. C.)

CONTINGENT REMAINDER, in law, a remainder limited so as to depend on an event or condition which may never happen or be performed, or which may not happen or be performed till after the determination of the preceding estate.

There are four sorts of contingent remainders: *First*. Where the remainder depends entirely on a contingent determination of the preceding estate itself, as where an estate is settled to the use of B till C return from

Rome, and after such return of C then remainder over. *Second.* Where the contingency on which the remainder is to take effect is independent of the determination of the preceding estate, as where an estate is settled to A for life, remainder to B for life, and if B die before A remainder to C for life. *Third.* Where the remainder is limited to take effect upon an event which, though it certainly must happen some time or other, yet may not happen until after the determination of the particular estate, as where a settlement is made to A for life, and after the death of B remainder to another in fee. *Fourth.* Where a remainder is limited to a person not ascertained or not in being at the time when such limitation is made.

A striking feature of the law with relation to contingent remainders is the capacity to bar them. This may be effected by collusion of the life-tenant and ultimate remainder-man, if any such there be. If, for example, an estate be settled to A for life, remainder to his eldest unborn son in fee, and in default of such son to B in fee, here A and B can by collusion defeat the contingent remainder to A's unborn son. If A surrenders his life-estate to B prior to the birth of such son, he thereby incurs a forfeiture of which the next succeeding remainder-man can avail himself. There being no estate vested in the unborn son, B is of course the next remainder-man. The whole fee vests therefore in him, and will not thereafter open to allow the intervention of the estate of A's son should he be born. To prevent this result, most modern settlements provide for trustees to preserve contingent remainders, by whose intervention B is prohibited from taking advantage of the forfeiture. See REMAINDER.

(L. L., JR.)

CONTRABAND OF WAR. Contraband of war embraces both persons and property. Persons of a military character on board neutral vessels are liable to capture when on their way for the purposes of the belligerent. In the case of the Trent, Mr. Seward contended that civil officers sent out in the service and at the expense of the enemy, and bearers of contraband despatches, were also contraband of war; but by treaties of the United States with various countries the principle is recognized that persons in neutral ships are not to be seized unless they are officers or soldiers and in the actual service of the enemy; and this appears to be the better rule.

See Vol. VI. p. 284 Am. ed. (p. 320 Edin. ed.).

What constitutes contraband goods has been a perplexing question for a long period. In the absence of international convention it was said by Chief-Justice Chase that merchandise is divided into three classes, the first consisting of "articles manufactured and primarily and ordinarily used for military purposes in time of war; the second, of articles which may be and are used for purposes of war or peace according to circumstances; and the third, of articles exclusively used for peaceful purposes." "The first class, destined to a belligerent country or places occupied by the army or navy of a belligerent, is always contraband; the second class is contraband only when actually destined to the military or naval use of a belligerent; while the third is not contraband at all, though liable to seizure and condemnation for violation of blockade or siege." From the various authorities it may be deduced that the following articles are among those absolutely contraband: Arms, and machinery for their manufacture; ammunition, and materials for it, such as lead, potash, and nitrate of soda, gunpowder, saltpetre, brimstone, and gun-cotton; military and naval stores; military clothing and equipments. The following are conditionally contraband: Money, provisions and liquors, materials for the construction of railroads, telegraphic materials, coal, nav. horses, timber, tallow, rosin, etc., etc. It has been held that paper and printing-presses, and postage stamps belonging to the enemy and intended for immediate use, are contraband (*The Bermuda*). By treaty between the United States and Bolivia the following articles are specified as contraband of war: (1) Cannons, mortars, howitzers, swivels, blunderbusses, muskets, fuses, rifles, carbines, pistols, pikes, swords, sabres, lances, spears, halberds, grenades, bombs, powder, matches, balls, and everything belonging to the use of arms; (2) bucklers, helmets, breastplates, coats-of-mail, accoutrements, and clothes made up in military form and for military use; (3) cavalry belts and horses, with their harness; (4) generally, all offensive or defensive arms made of iron, steel, brass, copper, or of any other material, prepared and formed to make war by land or at sea. The United States Government has also entered into treaties with Venezuela, the Dominican Republic, and the Two Sicilies containing similar provisions.

A ship is contraband when used or intended to be used by the enemy; and such a ship is liable to confiscation, together with any goods on board belonging to her owner. The prevailing rule among nations is that a ship not itself contraband, but carrying contraband goods, is subject to confiscation; but the United States Government has by recent treaties recognized the milder doctrine that only the contraband goods shall be subject to confiscation.

(A. P. S.)

CONTRACT (from the Latin *contrahere*, to draw together) is the term used to express an undertaking or agreement enforceable by law. It has been defined by Blackstone as "an agreement, upon sufficient consideration, to do or not to do a particular thing;" by Chief-Justice Marshall, "an agreement in which a party undertakes to do or not to do a particular thing;" and by Prof. Theophilus Parsons, "an agreement between two or more parties for the doing or not doing of some particular thing." The law of contracts, in its fullest sense, embraces nearly all the law regulating human affairs both in business and social life; for, in the language of Prof. Parsons, "out of contracts, express or implied, declared or understood, grow all rights, all duties, all obligations, and all law." The subject is treated fully in the work to which this is a Supplement, and the general principles there laid down are applicable to this country and to many other countries also; for there is a singular harmony in the jurisprudence of all the modern nations of the world on this subject. Contracts are generally divided and classified according to—1, their form; 2, the mode of their creation; and 3, the time of their performance. In form, contracts are either of *record*, such as judgments, recognisances, etc., or *specialties*—*i. e.*, in writing and under seal; or else *simple*, which term includes all other contracts, whether written or merely oral. As to the mode of their creation, contracts are either *exp* ed by the parties in direct and formal ter Ot when the contract rests upon constru from the circumstances and the acts of t s to the time of their performance, co executed, where the obligations have been parties, or *executory*, where t done what is necessary to fulfil sential elements of a legal c

See Vol. VI. p. 286 Am. ed. (p. 322 Edin. ed.).

parties; 2, mutual assent of the parties; 3, a valid consideration; and 4, a definite subject-matter. Any one not under a legal disability, such as infancy, marriage, or lunacy, may be a party to a legal contract. The assent of the parties must be mutual, and it must be either expressly given or clearly implied from the circumstances and the acts of the parties. The consideration of a contract, the *quid pro quo*, to be valid, must come within the rule that it shall either be some benefit to the party promising or some disadvantage or injury to the party to whom the promise is made. The *remedy* upon contracts is usually by an action at law, in which may be recovered the sum due by the party who has made default, or such damages arising from his breach of the contract as the plaintiff may have suffered. But, inasmuch as the mere payment of damages cannot, in some cases, be a complete satisfaction to the injured party, whose injury has resulted from a failure on the part of the other to do what it was in his power to do, courts of equity will, in such cases, as an adequate remedy cannot be had at law, decree a *specific performance* of the contract. The best treatment of the subject of contracts by American writers may be found in the works of Story, Kent, and Parsons. (S. W.)

CONTRERAS. See MEXICAN WAR.

CONTRIBUTION, in law, the doctrine whereby one of several parties who has discharged a common debt or obligation for the benefit of all is enabled to recover from each of his fellows a proportional part of the money laid out by him for them. The doctrine of contribution is said not to depend upon contract, but to be based on the abstract principles of justice.

Contribution could not originally be enforced in courts of common law, and hence came to be a subject of distinctively equitable cognizance. In process of time the common-law courts began to administer justice in such cases through the medium of an implied assumpsit. The peculiar facilities which are afforded in courts of equity, however, to adjust the rights of the various parties, have caused almost all cases on the law of contribution to be litigated before those tribunals, as in this way more satisfactory results are found to be attained.

The doctrine of contribution is most frequently applied in the case of sureties. Where there are two or more sureties, and one pays the debt for which all are bound, the surety who pays has a right to recover from each of his co-sureties his proportionate share of the common burden. In order to entitle the surety to relief in such case it must distinctly appear that the persons against whom he is seeking contribution really occupy towards him the position of co-sureties. He must further show that he has actually paid the debt, and not merely that he is pressed to do so. He must then prove that he has resorted in the first instance to the principal, but has failed to collect the amount paid out from him. In no case can a surety recover from his co-sureties more than the amount actually paid by him. If, therefore, he has compromised the debt, t] compromise will inure to the benefit of all the s.

ere some of the co-sureties are insolvent, the rden of the debt is divided among the solvent sure- and the party paying is entitled, therefore, to er from each of the others an amount dependent the number of those actually able to pay. As ight of co i n is an equitable right, it will gs superior equities of a third party or of the co-surety, nor will it be enforced to the prejudice or injury of the creditor. (L. L., JR.)

CONVERSION, a change of property from real to personal or from personal into real, not actually taking place, but presumed to exist only by construction or intendment of law.

Conversion is a doctrine of exclusively equitable origin, and is applied for the purpose of preventing manifest injustice, which would otherwise in many cases ensue. It is applied (1) in the case of contracts, (2) in the case of settlements and wills.

(1) As to contracts. Whenever a binding contract is made for the sale of land, *eo instante*, from an equitable point of view, conversion ensues. The purchaser is thenceforth regarded for many purposes as the owner of the land, and the rights of all parties claiming under him are determined by the rules applicable to the devolution of realty. The right of the vendor, on the contrary, is deemed to be exclusively to the purchase-money, and if he die the right to recover that amount vests in his executor.

(2) As to settlements and wills. Whenever a settler or testator by deed or will peremptorily directs land to be converted into money or money into land, the transmutation will, in equity, be deemed to be effected from the moment when the deed or will goes into operation, and the rights of all parties claiming under or through the beneficiaries will be determined by the rules of law which govern the property in its converted shape. Thus, if A devise real estate to his executors, and direct them to sell the same and pay the proceeds to B, and afterwards B dies prior to the disposition of the property, it will be held that B's personal representatives are entitled to the proceeds of the land, and not his heirs. On the other hand, had the testator bequeathed money to his executors, directing them to buy land and convey the same to B, and subsequently B had died prior to the purchase, his heirs would have been held to be entitled, and not his personal representatives.

In order to bring this doctrine into play it is essential that the testator's direction to convert be imperative, leaving no discretion in any one whether the conversion shall or shall not take place. Such an imperative direction may be implied (1) from direct words of command, or (2) by such disposition of the property as necessarily to require a conversion.

It makes no difference how long the actual conversion is to be postponed. In contemplation of equity if it is ever certain to take place it is effected from the moment the deed or will goes into operation.

The doctrine of conversion, being a mere fiction for the purpose of effecting certain ends of abstract justice, will never be applied where there are no distinctive reasons demanding its application. Its effect will also be invariably limited to the purpose of the testator or donor, and therefore in the event of a failure of that purpose the property will devolve according to its original character.

Reconversion is that imaginary process by which a prior constructive conversion is annulled and taken away, the converted property being restored, in contemplation of equity, to its original and actual condition. The beneficiaries under any deed or will whereby a conversion of property is commanded are at liberty at any time before the actual conversion takes place to elect to have the property in its unconverted shape. From the moment that such an election is made the property is said

to be reconverted. Reconversion may also in some cases take place by operation of law. (L. L., JR.)

CONVEYANCING. The system of conveyancing in vogue in the United States is much less complex than that employed in England. This circumstance may be accounted for by a variety of considerations. The elaborate family and marriage settlements common in England are seldom or never made use of here. The land is more equally divided among the people, and there is a comparatively small number of great landed proprietors. Even if a single individual does acquire great quantities of real estate, the absence of the law of primogeniture tends speedily to divide his acquisitions. Real estate passes from hand to hand more frequently in this country than in England. Hence there has been a necessity of more convenient methods for its transfer than those adopted in the mother country.

See Vol. VI. p. 288 Am. ed. (p. 324 Edin. ed.).

Deeds and conveyances of all kinds in the United States are usually extremely concise in their terms. In some of the States short and apt forms have been provided, which are by statute declared as efficacious as the lengthy and cumbrous instruments drawn up by English conveyancers. In almost all of the States deeds are usually engrossed upon printed forms, thus saving infinite trouble and expense. All unnecessary forms have been dispensed with. The former elaborate covenants for title have been reduced to three—the covenant of seisin, the covenant against incumbrances, and the covenant of general or special warranty. The insertion of any other covenants in a deed is the exception rather than the rule.

A seal of wax is no longer essential to a valid deed. In Alabama, Iowa, Kansas, Kentucky, and Texas seals have been altogether abolished by law. In Arkansas, Delaware, Florida, Georgia, Illinois, Maryland, Michigan, Minnesota, Missouri, Mississippi, North Carolina, Ohio, Oregon, South Carolina, and Wisconsin, a mere scroll of the pen has been pronounced a sufficient seal. In almost all the other States a rude drawing in pen and ink, a piece of paper gummed to the instrument, or a bit of ribbon drawn through it, is pronounced equally effective.

In the United States deeds are almost invariably acknowledged before a judge, magistrate, notary public or some other appropriate person designated by law, whose certificate and seal are then appended thereto. This has the effect of rendering the deed admissible in evidence without further proof of its execution, and also entitles it to be recorded. The system of recording deeds prevails universally throughout the United States. In every county a register's or recorder's office is provided where the deeds are transcribed into large books kept for that purpose. Indices of the various conveyances recorded are open to the public, and thus sure and satisfactory information may be acquired by any one dealing as to land, with respect to the true state of the title thereof. Speaking generally, it may be said that, as between two conflicting claimants to land, he who first puts his deed on record has the prior right, unless indeed at the time of his acceptance of the deed he had notice, express or implied, of a valid title in the other party.

The value of the recording system in insuring safety to titles, and in promoting ease of transfer from one person to another, cannot be overestimated. It has in addition other and equally valuable features. The preservation in public offices of exact copies of all muniments of title renders it far less necessary to have such muniments drawn up in the first instance in expensive and permanent shape. Paper may be substituted for parchment, and elaborate recitals omitted which the fear of losing the instruments thereby referred to would otherwise cause to be inserted. The loss of title-deeds is also made of far less moment. It is indeed the custom in some of the Southern States to destroy a deed immediately after it has been recorded, the fair record being deemed more desirable than the instrument itself with possible erasures or interlineations.

The system of mortgages is equally simple. The instruments employed are very brief and concise, and are also universally acknowledged or recorded. Equitable mortgages by the deposit of title-deeds are entirely disused, and in some States have been pronounced inefficacious. The comparatively recent origin of most of our titles renders it an easy task in most instances to trace the title to the fountain-head. It is, therefore, the common practice of conveyancers in examining into a title, to pursue their investigations as far as the original grant from the commonwealth or the United States. In the older States the length of time which has elapsed since the primitive settlements renders this task, in some instances, a difficult one. Proposals have been already made to abridge the length of time covered in such cases, and these will no doubt ultimately be adopted. The statutes of limitation universally existing to quiet the possession of title will contribute much to this end.

In the Western States the division of the land by the government into surveyed blocks much facilitates conveyancing operations. These are, of course, still in their infancy in that region.

The business of conveyancing is carried on in the larger cities and towns of the United States by persons termed conveyancers. These are sometimes, but by no means always, learned in the law. They unite the functions of a scrivener with those of an English attorney and conveyancing counsel. They prepare all necessary papers and pass upon the title. Of late, companies have been formed in some of our large cities which carry on the business of conveyancing, and also insure the title to real estate. Where a conveyance of land is made, the purchaser usually employs the conveyancer, who acts as his agent. Where a mortgage is executed, the mortgagee names the conveyancer, but the charges of drawing the mortgage and passing the title are paid by the mortgagor.

(L. L.,

CONWAY, Moncure Daniel, [illegible] and public teacher, [illegible] Fredericksburg, Va., [illegible] having been a granddaugh[illegible] of Th[illegible] er of the Declaration of [illegible] in Stafford co., Va., March [illegible] through the neighbori[illegible] he went to Dickinson [illegible] graduated in 1849. In [illegible] law, and wrote occasionally for [illegible] *iner*, then edited by his [illegible] also wrote, in his ninet[illegible] cating the introduction of [illegible] Having abandoned the legal [illegible] minister of the Baltimore [illegible] was appointed to Rockville [illegible] appointed to Frederick cir[illegible] his theological views having [illegible]

wards Unitarianism, he resigned his charge, and early in 1853 entered the Divinity College, Harvard University, where he graduated the following year. He was at once settled with the Unitarian church at Washington, where he remained two years. His anti-slavery discourses having led to dissatisfaction in the society, he was compelled to leave, and accepted a call to the First Congregational Church in Cincinnati. Here he also published *The Dial*, a monthly periodical. On the breaking out of the Civil War, Mr. Conway devoted himself to delivering free lectures throughout Ohio advocating immediate emancipation as the only means of terminating it. His works on the same subject, *The Rejected Stone* (1861) and *The Golden Hour* (1862), having attracted a good deal of attention, he was invited to speak in New England, and changed his residence to Concord, Mass. In 1863 he visited England, and gave lectures in various parts of that country and Scotland on the struggle in America. He wrote various articles in the English magazines intended to stem the tide of sympathy with the Confederacy, and also published there a work entitled *Testimonies concerning Slavery* (1864). The war having ceased, Mr. Conway, whose theological views had become extremely radical, accepted an invitation to settle with the South Place Free Religious Society in London. In August, 1884, he resigned this pulpit, with the purpose of returning to America and confining himself to literature. His chief publications are—*The Earthward Pilgrimage* (1870), *Republican Superstitions* (1872), *The Sacred Anthology, a Book of Ethnical Scriptures* (1874), *Idols and Ideals* (1877), *Demonology and Devil-lore* (2 vols., 1879), *A Necklace of Stories* (1880), *The Wandering Jew* (1881), *Thomas Carlyle* (1881), *Emerson at Home and Abroad* (1882), *Travels in South Kensington* (1882.)

CONWAY, THOMAS (1733–1800), a major-general in the American Revolution, was born in Ireland, Feb. 27, 1733. He was educated in France, and entered the French service, rising to the rank of colonel. In 1777 he was induced by Silas Deane to come to America, was made a brigadier-general, and fought in the battles of Brandywine and Germantown. Having urged upon Congress the need of an inspector-general, he was appointed to that position in December with the rank of major-general, being thus promoted over his seniors in commission against the protest of Washington. In Nov., 1777, Major Wilkinson, while on his way from Saratoga to York, Pa., where Congress was in session, with despatches relating to the surrender of Gen. Burgoyne, stopped at the quarters of Lord Stirling at Reading, Pa., and in conversation reported some expressions used by Conway in letters to Gen. Gates disparaging Washington and censuring his management of the war. These were soon reported to the commander-in-chief, but Gates, on being questioned, pronounced the statements false. In the same month, however, a new Board of War was formed, with Gen. Gates as president, and soon Conway was busy in an intrigue with some members of the board and other influential persons to have Washington superseded by Gates. An important preliminary step to the execution of their plan was to separate, and if possible alienate, La Fayette from Washington; to accomplish this an invasion of Canada was projected under the command of the French marquis, with Conway as second. La Fayette, following the advice of Washington, accepted the position offered him, and went to Albany, where he waited in vain for the men and supplies promised. As the real design of the "Conway Cabal" became known, it was universally condemned, and its authors were deprived of the power to do further mischief. Conway, professing to feel hurt at the distrust shown towards him, offered his resignation, which, contrary to his expectations, was promptly accepted. On July 4 he fought a duel at Philadelphia with Gen. Cadwallader, who charged him with cowardice at the battle of Brandywine. Conway, supposing the wound he had received to be mortal, sent a penitent letter to Washington, and on his recovery returned to France. He again entered the French service, and in 1779 was a general in the army of Flanders. In 1781 he went to India, where he was made colonel of a regiment. In 1784 he was appointed governor of Pondicherry and the French possessions in India, with the rank of field-marshal. When the French Revolution broke out he was obliged to fly, and was saved only by the intervention of the British authorities. He died about 1800.

COOK, JOSEPH, an American lecturer, was born at Ticonderoga, N. Y., Jan. 26, 1838. His name was originally Flavius Josephus, but while at college he shortened it to its present form. After a preparatory training at Phillips Academy, Andover, Mass., he entered Yale College in 1858. Two years later he was obliged to leave on account of impaired health, and in 1863 he went to Harvard College, whence he graduated in 1865. He then spent three years in the study of theology at Andover, and being licensed to preach, supplied some churches in Massachusetts, but has never been ordained. In 1871 he went to Germany and devoted two years chiefly to theological study, though he also travelled as far as Egypt and Syria. On returning to the United States he settled in Boston, and preached in various churches. In 1875 he was invited to deliver a series of lectures on the relations of religion and modern civilization. The course, called the "Boston Monday Lectures," has been chiefly delivered in the Park Street Church and Tremont Temple, and widely published in newspapers. Each year one or more courses were delivered until 1881, when Mr. Cook went abroad and spent two years in travelling around the world. He delivered many lectures in Great Britain, India, Japan, and other countries, and returning to Boston towards the end of 1883 resumed his Monday Lectures. Several volumes of his lectures have been published, among which are those on *Biology*, *Transcendentalism*, and on *Orthodoxy* (all in 1877); on *Conscience*, *Heredity*, *Marriage* (1878); on *Labor* and *Socialism* (1880), also *The Occident* (1884), *The Orient* (1886), etc. He has been a popular champion and expounder of the conservative New England orthodoxy, and has expressed freely his opinions on all questions of the time.

COOKE, JAY, an American financier, was born at Sandusky, Ohio, Aug. 10, 1821. He is the son of Eleutheros and Martha Cooke, and is in direct descent from Francis Cooke, who came to Plymouth in the Mayflower. Eleutheros Cooke, a lawyer of extensive practice, was frequently a member of the Ohio legislature, and in 1831 was elected to Congress, where he was one of the founders of the Congressional Temperance Society. He died Dec. 28, 1864. Jay Cooke came to Philadelphia, and entered the banking-house of E. W. Clark & Co., in which he became a partner at the age of twenty-o . This firm was prominent in the negotiation of G loans during the Mexican War. Mr. Cooke in 1858, but on the

breaking out of the Rebellion established the firm of Jay Cooke & Co., and undertook the agency of the Government for the negotiation of its loans. This work he successfully accomplished, supplying the Treasury with more than $2,000,000,000, all of which passed through his hands. During the darkest hours of the war he was faithful at his post, and by his energy and financial skill contributed materially to the success of the Union cause. His wealth was spent generously, and his summer residence on an island in Put-in Bay, in Lake Erie, near Sandusky, afforded a hospitable retreat to many poor clergymen needing a few weeks' respite from their labors. After the war his firm became the agents of the Northern Pacific Railroad, but misfortunes overtook them in 1873, and their suspension caused the panic of that year and the business depression which followed. Mr. Cooke still retained his faith in the resources of that railroad, and was employed by the receivers to whom his affairs had been assigned for the benefit of his creditors. He devoted himself with unabated energy to the labor of regaining his former position, and in eight years accomplished this herculean task.

COOKE, JOHN ESTEN, a prominent Virginia author, was born at Winchester, Nov. 3, 1830. His father was a distinguished lawyer; his mother, Maria Pendleton, was descended from the Revolutionary judge of that name. Young Cooke's infancy was passed in the Valley of Virginia, but at an early age his father removed to Richmond to practise his profession in the court of appeals, and the boy was placed at school in that city. At nineteen he left school, studied law, was admitted to the bar, and practised four years, when he quitted the profession in order to devote himself exclusively to literature. His first work, *Leather Stocking and Silk*, was published in 1853, and was well received; this was followed the next year by *The Virginia Comedians*, in two volumes. This novel and its sequel, *Henry St. John, Gentleman*, with *Canolles* and *Cary of Hunsden*, described the picturesque old Virginia society of the last century, covering the whole of the interesting period from 1765 to 1781. Between 1856 and 1861 he was a frequent contributor to the *Southern Literary Messenger*, for which he had written from the beginning of his literary career.

When the Civil War broke out he reluctantly threw aside his pen for the sword, and served under Stuart and Jackson. At the close of the war he resumed his literary labors, his first work being the *Life of Stonewall Jackson*, which was published in 1865. The same year he wrote *Surry of Eagle's Nest*, in which, under the form of a novel, he narrated some of the most stirring events of the war from his own experience. The book was very popular, and rapidly went through seven editions. The war was a fresh literary field at that time, and Mr. Cooke was so successful in it that he followed *Surry* with *Wearing of the Gray*, *Hilt to Hilt*, *Mohun*, *Hammer and Rapier*, the *Life of Gen. Lee*, etc.

Among Mr. Cooke's later novels are *Pretty Mrs. Gaston*, *The Virginia Bohemians*, and *Mr. Grantley's Idea*. These introduce characters of the present day, but still amid the Virginia scenery, which the author loves to depict. They are marked by the same easy flow of language and incident as his earlier publications. Besides contributing frequently to *Harper's Magazine* and other periodicals, Mr. Cooke prepared for the young a *History of Virginia*, and edited *The Life of Capt. John Smith*. His latest novels were *My Lady Pokahontas*, and *The Maurice Mystery* (1885). He died Sept. 27, 1886. (E. L. D.)

COOKE, HENRY, D. D., LL. D. (1788–1868), an Irish Presbyterian minister, was born at Grillagh, near Maghera, county Derry, May 11, 1788. He graduated at Glasgow University in 1806, and in 1808 was ordained pastor of the Presbyterian church of Duncane. Two years later he became pastor of the church at Donegare, county Antrim, and while holding this charge entered on the contest with Arianism which first rendered him famous. That he might be better fitted for the struggle he returned to his college studies, spending three years (1815–1818) at Glasgow University and Trinity College, Dublin. He then became pastor of the church at Killyleagh, county Down, and in the meetings of the Presbytery and Synod he was the champion of the orthodox party, while the Arians were led by Rev. Henry Montgomery, a man of great tact, eloquence, and learning. The Presbyterian people of the North of Ireland had long held the Westminster Confession of Faith and Catechisms in high esteem and even veneration. Cooke showed them that their prominent ministers were quietly but steadily departing from these standards; he infused courage into the ministers who were weakly deploring the movement instead of resisting it. Repeatedly he forced a contest upon his opponents, and finally secured the passage of an act requiring all the ministers to subscribe anew to the Confession of Faith. The act was carried into effect in 1829, but the opposing party withdrew and formed the Remonstrant Synod of Ulster. His victory was hailed with approval by Presbyterians throughout the world. Jefferson College, in Pennsylvania, conferred on him the degree of D. D., and Trinity College, Dublin, that of LL. D. He was called in 1829 to the pastorate of May Street Presbyterian Church, the largest in Belfast, and remained in that position till his death. In 1847 he was made professor of sacred rhetoric and president of the faculty in the Assembly's College, Belfast. He was also three times elected moderator of the General Assembly, and his position as leader of the Presbyterian Church of Ireland caused his influence to be sought by the government. Besides assisting in other measures for the general welfare of the people, he took part in the establishment of the plan for national education which was adopted in 1830. He was noted for eloquence as a preacher as well as his tact in managing large assemblies. While a strenuous champion of orthodoxy, he was free from sectarian bitterness, and established friendly relations between the Presbyterian and the Established Church of Ireland. The Presbyterian Church in Ireland owes its present healthy and prosperous condition in great measure to the labors of Dr. Cooke. He died at Belfast, Dec. 13, 1868. His biography has been written by his son-in-law, Rev. J. L. Porter, D. D., under the title *Life and Times of Henry Cooke* (London, 1871; new ed., Belfast, 1875).

COOKERY, AMERICAN. While French *cuisine* generally regarded as the best in the world, it has been generally adopted in the United [illegible] have in time acquired a peculiar and [illegible] of their own. This has come from [illegible] new and developing country as well as [illegible] character of many of the native prod[illegible] French method may rather be [illegible] perfection of *réchauffée*, the sc[illegible] and economizing, while America[illegible] the natural viand and is somewhat [illegible] means of treatment. We have on[illegible] close coal-stoves or [illegible]; we [illegible] gridiron, and the [illegible]

European kitchen would be out of place and actually dangerous if neglected. The French system grafted on the American affords an advantage in saving or reducing waste, rather than in actual preparation of food. While the matter of taste is not open to argument or capable of final adjudication, there can be hardly a doubt that the more the natural taste and individuality of food is retained the better it is. From this it follows that a simple roast or a plain broil cannot be surpassed, whereas the famous *pot au feu* is the means of utilizing many different materials at the sacrifice of the distinctive peculiarities of all. The French excel the world in soups, for example; but what is soup but the essence of meat, fish, or vegetable, flavored in a hundred different ways? In America the same meat, fish, or vegetable would be cooked in a more wasteful way, but so as to retain its natural character. In Europe plain vegetables and plain roasts are rarely served unless at very wealthy tables; in America soups are rarely used except at large dinners and at fashionable hotels, and then are either turned out of can or made of meats and vegetables, with the result left to accident. Our waters produce the finest fish in the world —the salmon, the shad, which is much superior to the European species; the Spanish mackerel, regarded by some judges as the most delicious of all; the pompano, the pride of the Gulf of Mexico; the beautiful red-snapper; the white-fish of the Great Lakes, and a number of smaller but equally excellent kinds. A fish is never better than when boiled simply and plainly with suitable sauce. Cold fish warmed over, except in the shape of that American dish, the fish-ball, is not good, and all foreign attempts to make it so have failed. The flavor is so delicate that simplicity in preparation is a necessity to a satisfactory result.

In shell-fish America has many advantages; crabs are abundant and delicious, soft-shell crabs being accepted as a national dish, though to refined palates they are not as epicurean as the healthy hard crab. The raw oysters of France and England are preferred by those who are used to eating them; but the stewed, fried, and roast oyster are found in perfection only in the United States. The salt water, diamond-backed terrapin is found only along the American Atlantic coast, and it and the canvas-back ducks have attained a reputation the world over unequalled and well merited. A perfect dinner could only be procured in America. A boiled Spanish mackerel, or a broiled or, what is better, "planked" shad, and potatoes for the first course; stewed terrapin or fried oysters, or both, with a mayonnaise of lobster with the oysters, and peas or lima beans, or sweet corn, or all of these, for the second course; and a canvas-back duck (roasted just fifteen minutes) to each guest for the third course, with a salad or currant jelly, as individual taste may dictate. Then sweets, cheese and coffee, and no *cuisine* nor *cordon bleu* can produce a dinner to surpass it. Perfection is attained combined with perfect simplicity, and only in America is such a dinner a possibility. Compare this with a regulation entertainment under ordinary auspices. First come a few cold, clammy raw oysters, which are only suitable for lunch or a stomach stay; then a soup which, if thin, is beef-tea with a few vegetables floating in it, but if thick, is heavy and substantial enough to destroy appetite. Next, fish swimming in gravy between truffles or mushrooms, with no flavor of its own. Then a mess sometimes well flavored, often tasteless, in a little form of pastry. Next, sundry meats cooked up with carrots, turnips, truffles, or mushrooms, so that the natural flavor is utterly extinguished. Finally, chicken or game, the former greasy, the latter cooked out of recognition. Let any intelligent man of healthy stomach compare these dinners, and decide whether French cookery has the superiority over American. Nature has given to each meat, fish, and vegetable its own peculiar taste, and the purpose of cookery should be to retain and develop this taste, not to confound, destroy, and obliterate it.

There are certain dishes which are favorites in our country, and which have come to be looked upon as national, although they may not have originated with us. Griddle-cakes, which are eaten all over the civilized world, have been immensely developed and perfected with us, and few breakfast dishes are better than well-cooked wheat- or rice-cakes. Strawberry short-cake may also be regarded as especially American. Boston baked beans are as famous as they are satisfying to a hearty hunger. Clams raw or as chowder are peculiar to America, and pumpkin pie is more frequently eaten here, if it is equally appreciated abroad. In fact, the two points that distinguish American cookery are the extent and variety of material, and the simplicity of its preparation. It is not to be judged by that abomination which has almost established itself as a national article of food, the fried beefsteak, than which, as it is generally prepared, nothing can be worse for the palate or the stomach. Nor by that twin essence of evil, the saleratus biscuit, which has committed incalculable wrong against the rural digestion and happiness. But as it is practised in intelligent households, the *cuisine* of the United States will compare favorably with that of any nation in the world. (R. B. R.)

COOLEY, Thomas McIntyre, LL.D., an American lawyer, was born at Attica, N. Y., Jan. 6, 1824. He removed in 1843 to Michigan, was admitted to the bar at Adrian in 1845, and for a time was an editor. The State legislature in 1857 appointed him to the work of compiling and publishing the laws of Michigan. He was (1858–65) reporter of the decisions of the State Supreme Court, and published (vols. v.–xii.) Michigan Supreme Court Reports. He also published an addition of Harrington's *Chancery Reports*, with notes (1872.) In 1859 he became a law professor in the State University at Ann Arbor. He was made one of the judges of the State Supreme Court in 1864, but retired from the bench in 1885, and was appointed by Pres. Cleveland chief of the Inter-State Railroad Commission. Among his works are *Constitutional Limitations upon the Legislative Powers of the States* (1868; 3d ed., 1874); Story's *Commentaries on the Constitution*, with additions (1873); *The Law of Taxation* (1876), and *Michigan. A History of Government* (1885).

COOPER, Peter (1791–1883), an American philanthropist and manufacturer, was born in New York city, Feb. 12, 1791. His grandfather, John Campbell, had been a deputy quartermaster-general of the American army in the Revolutionary war, and his father was a lieutenant in that army. The latter afterwards engaged in hat-making, but not being very successful removed to Peekskill, where he kept a country store. Peter Cooper had only one year of meagre schooling, and until he was seventeen years of age was kept busy by his father, learning hat-making, ale-brewing, and brick-making. He was then apprenticed to Mr. Woodward, a coach-maker, and while in his employ not only distinguished himself by industry and integrity, but also constructed a machine for mortising

the hubs of carriage wheels, which proved very profitable to the owner. When Cooper reached manhood Mr. Woodward offered him capital to start in business, but declining this, he went to Hempstead, L. I., where he was employed in making machines for shearing cloth. He bought the right to manufacture these machines for the State of New York, and for a time was very successful; but the business ceased to be profitable after the conclusion of peace with Great Britain in 1815. Cooper then successively attempted the trade of cabinet-making, the grocery business, and finally the manufacture of glue. For the latter he purchased on a lease of 21 years a factory and other buildings with three acres of ground on Old Middle Road (about Thirty-second street) in New York city. Here he manufactured glue, oil, whiting, prepared chalk, and isinglass. By careful attention to the business he soon got the reputation of making the best glue in the market, which found a ready sale and brought him large returns. When his lease expired the business was removed to Williamsburgh, where he purchased ten acres of ground for the purpose. His enterprise, however, was not confined to this business. In 1828 he purchased for $105,000 three thousand acres of land at Canton, a suburb of Baltimore, where he erected large iron-works, and afterwards added a rolling-mill. Locomotives had recently been introduced on railroads, but it was believed that the Baltimore and Ohio Railroad, then building, was unfitted for their use on account of its numerous short curves. The proprietors of the road were greatly disheartened at the prospect of its failure, but Mr. Cooper's inventive genius was stimulated. In 1830 he constructed from his own designs the first American-built railway locomotive. It was called "Tom Thumb," and was used successfully on the road in August of that year. On its trial trip it carried its own wood and water, had six men on an open platform, and drew a car with thirty-six men. On a grade rising 18 feet in a mile it ran 13 miles in 72 minutes, and returned in 57 minutes. Though too small to be of permanent service this engine had proved the practicability of using locomotives on the road, and probably saved the company from bankruptcy. Soon after this Mr. Cooper sold his iron-works in Baltimore, but two years later built other works in New York, which he leased for a time, but was eventually compelled to take into his own management. In these he manufactured wire, and applied successfully for the first time anthracite coal in iron-puddling. In 1845 he removed his works to Trenton, N. J., where they steadily grew into an extensive establishment with subsidiary iron-furnaces in other places. Among these were three large blast-furnaces at Phillipsburg, Pa., and the Durham furnaces 25 miles from Trenton. For many years he employed over 2500 workmen, whom he paid punctually and faithfully. He afterwards sold one-half of the works in order to form a company called the Trenton Iron Works for the management of the vast and increasing business. Finally a division was made by which the company took the blast-furnaces, and Mr. Cooper the rolling-mills and ore-lands. During his active business career he had invented a number of useful devices, among which were one for propelling canal boats by water-power, a machine for grinding plate glass to a perfect plane, an automatic cradle, a cylindrical machine for making wrought-iron rapidly, and many others which might have proved profitable to him had he cared to seek such advantage from them. He was an early advocate and promoter of the electric telegraph. He invested largely in this enterprise, and about 1855 became the President of the North American Telegraph Company, which then controlled one-half of all the telegraph lines in the country. He was thus led to engage in the first attempts to lay a cable across the Atlantic, and continued to assist the enterprise liberally until it resulted in complete success.

Though Mr. Cooper's education had been neglected he highly appreciated the advantages of proper training, and when fortune smiled upon him resolved to assist youth of later generations in procuring what had been denied to himself. As his plans became definitely formed in his mind he purchased the lots and buildings between Third and Fourth avenues and Seventh and Eighth streets in New York city. Here in 1853 he began to build the brown stone structure known as the Cooper Union, and six years later he gave a deed of the property to trustees incorporated by the State legislature. In the act of incorporation the building is declared to be forever devoted to the union of science and art in their application to the useful purposes of life. The building had cost $634,000, but to this Mr. Cooper added other donations that his benevolent plans might be fully carried out. Free schools giving instruction in various arts and sciences, free reading-rooms, free courses of scientific lectures have been successfully maintained for many years. The chief support of the various departments is derived from the rents of the stores and offices which occupy three stories of the buildings, and from an endowment of $150,000. The lecture-halls are also rented for public meetings. The classes are open to young women as well as young men, and those who pursue their studies for five years are entitled to a diploma certifying their attainments. Other certificates are also given to those who pass a satisfactory examination. Mr. Cooper took a warm personal interest in the execution of his benevolent ideas, and frequently visited the classes and other departments of the Union to examine their practical effects. His long life enabled him to witness and enjoy the gratifying result of his practical philanthropy.

Mr. Cooper's interest in the welfare of the la
classes also led him to a consideration of
problems of social science. His experience
ufacturer had impressed him with the
the protective system in developing
in each country, and especially in the
In the latter part of his life he was equ
that it is the duty of each government to
its people such amount and kind of cu
social needs should demand. During
tion in the United States, which
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in the United States, and led to
Greenback party. In 1876 the
party nominated Mr. Cooper for
81,000 votes were cast for that
secure any electoral vote.
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public-spirited, he still conti
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in unassuming style, and was
whose needs were made known to
spected for the purity of
was beloved by all classes of
a brief illness he died at New

COOPER, SUSAN FENIMORE, an

eldest daughter of the famous novelist, James Fenimore Cooper, was born in 1815. She has written numerous sketches describing country life. Her best-known works are *Rural Hours* (1850, 3d ed. 1876) and *Rhyme and Reason of Country Life* (1854). She has frequently contributed to periodical literature, and edited *The Journal of a Naturalist* (1852).

COOPER, THOMAS, M. D., LL.D. (1759–1840), a politician, natural philosopher, and jurist, was born in London, Oct. 22, 1759. He was educated at Oxford, studied medicine and law, and went to France as a representative of the democratic clubs of England. In his old age he said that the four months he spent in Paris were the happiest in his life, and that in them he lived four years. Mr. Burke having denounced his conduct in a speech in Parliament, Cooper published a violent reply, a cheap edition of which was prohibited by the Government. Having learned in France a process for making chlorine from common salt, he became a bleacher at Manchester. In 1792 he accompanied Rev. Dr. Priestley to the United States, and practised as a lawyer in Sunbury, Pa. Entering into politics, he opposed the Federal party, and published an article in a newspaper, in October, 1799, imprudently attacking President Adams, for which he was tried under the Sedition Act, and sentenced to six months' imprisonment. When he came out of prison, his sufferings as well as his talents placed him high in the esteem of the Republican party, which had now come into power. He was appointed a land commissioner for Pennsylvania, and when he had happily succeeded in settling difficult disputes in Luzerne county, Gov. McKean, in 1806, appointed him judge, but he was removed in 1811 by Gov. Snyder at the request of the legislature on a charge of arbitrary conduct. He then became professor of chemistry in Dickinson College, and in 1816 professor of mineralogy and chemistry in the University of Pennsylvania. In 1819 he became professor in the University of South Carolina, and in 1820 was made president, being also professor of chemistry and political economy. In the nullification contest he supported the ultra States' Rights doctrine. In 1834, on account of the infirmities of age, he retired from the presidency, and was appointed by the legislature to revise the statutes of South Carolina. Before completing the fourth volume, he died, at Columbia, May 11, 1840. Dr. Cooper was famous for the wide extent of his knowledge and his vigor of expression with voice and pen. Few men have had such an active career and excelled in such diverse departments. President Adams in his old age referred to Cooper as "a learned, ingenious, scientific, and talented madcap." Besides a number of pamphlets, he published *Information concerning America*, London, 1794; *The Bankrupt Law of America contrasted with that of England*, Phila., 1801; *An English Version of the Institutes of Justinian*, Phila., 1812; 3d ed., Phila., 1852; *Tracts on Medical Jurisprudence*, Phila., 1819; *Elements of Political Economy*, Charleston, 1826. He also edited three volumes of the *Emporium of Arts and Sciences*, Phila., 1814. A full account of his trial for libel on President Adams is given in Wharton's *State Trials of the United States*.

COOPER, THOMAS, an English Chartist, lecturer, and poet, who afterwards became a Baptist preacher, was born at Leicester, March 20, 1805. In early life, in spite of extreme poverty, he was diligent in the pursuit of knowledge. He was for a time a Methodist local preacher, but was afterwards dismissed from the Society and became a journalist. While editing a newspaper at Leicester in 1841, he showed some favor to the Chartists, and thereby lost his place. He then took charge of the Chartist journal, and labored in behalf of the oppressed working classes. In August, 1842, he was arrested and imprisoned on a charge of participating in a riot, but, on trial, was acquitted. At a second trial in March following he was found guilty of sedition, and sentenced to two years' imprisonment. During this time he composed his principal poem, *The Purgatory of Suicides; a Prison Rhyme*. It was published in 1845, and procured for him the friendship of some prominent men. He gradually withdrew from active connection with the Chartists, and devoted himself to lecturing on literary and moral subjects. About 1855 his religious convictions returned, and he lectured chiefly on the evidences of Christianity. In 1859, having embraced the views of the Baptists, he was immersed and ordained as a preacher. In 1866, his health having failed, his friends purchased an annuity of £100 for him. He has published *The Bridge of History over the Gulf of Time* (1872), which is a popular view of the historical evidences of Christianity. His other works are *Plain Pulpit Talk* (1873); *The Life of Thomas Cooper* (1873); *The Paradise of Martyrs* (1874). The last is an incomplete poem, similar in form, but different in spirit from his earlier poem,—a revised edition of which was issued in 1877.

CO-OPERATION appears to have been introduced into the United States through the New England fisheries. As far back as 1730, the cod and mackerel fishers and the whalers worked upon the share system. In 1752 mutual assurance began in the organization of The Philadelphia Contributionship for the Insurance of Houses from Loss by Fire; popularly known, from its seal, as The Hand-in-Hand. In 1767 The Corporation for the Relief of Widows and Children of Clergymen in the Communion of the Church of England in America was organized among the colonial clergy of that church. These early essays were very successful. The share system has continued in use, more or less, in the fisheries of New England down to our own times. The Philadelphia Contributionship, and the Pennsylvania Branch of the Corporation for the Relief of Widows and Children, etc., are still in prosperous business. In 1819 the Independent Order of Odd Fellows was instituted in this country; the chief aim of which was, and has continued to be, the mutual assurance of its members in accidents and sicknesses, and of their families in the event of death. From this point co-operation has had a continuous history, which will be surveyed in decades.

See Vol. VI. p. 300 Am. ed. (p. 338 Edin. ed.).

I. 1820–30. Robert Owen's famous experiment at New Harmony, Ind., occurred early in this period (1824–27.) A number of kindred societies were organized under the impulse of this agitation, eleven in all. Their history was brief, and as they were nearly all communistic in the theory and actual ownership of property, it is treated under COMMUNISM.

II. 1830–40. In this decade co-operative loan and building associations arose in Philadelphia, though apparently to no considerable extent. The records of these pioneers in one of the most successful phases of co-operation in our country are but little known. (See BUILDING ASSOCIATIONS.)

Early in this decade The New England Association of Farmers and Mechanics mooted the subject of co-operative distribution, but no action appears to have

resulted. Later on some labor organizations in New England revived the discussion, and stores were started, but appear to have disappeared speedily and silently.

III. 1840–50. This decade opened amid the remarkable wave of interest in co-operation which was roused by the social stir of the Transcendental movement in New England, and by the Fourierite propaganda of the New York *Tribune*. Brook Farm (1841–47), Hopedale (1841–57), and the thirty or more Fourierite Phalanxes (1843–47), were all primarily agricultural co-operative societies, and were in some instances, secondarily, industrial and manufacturing associations. All these experiments were failures, though a few were brilliant failures. (See COMMUNISM.) In the middle of this decade an effort was made to establish co-operative distribution, which for a while promised well. The Working Men's Protective Union, whose first council was held in 1845, attempted to organize the wage-classes for more economical purchasing. Local divisions formed branches of a central supply agency, through which goods were bought at reduced rates. In 1849 its name was changed to The New England Protective Union. The trade of the central store was given as follows:

1848	$112,507.79
1849	220,801.60
1850	535,338.56

By this time there were 106 divisions in existence, 83 of which reported a membership of 5109, while 84 returned a capital of $71,890.36. The highest amount held by any one division was $2765.51; the lowest, $150; the average, $855.63. The largest trade made at this time by one division was by No. 55, New Bedford, which, in 1849, made total sales of $31,278.64.

IV. 1850–60. The early part of this decade witnessed the further growth, and the later period the decline, of The New England Protective Union. The culmination of the organization was reached by the middle of the decade, by which time internal dissensions had brought about a division that was the beginning of dissolution. The old organization in 1855 reported 72 divisions, with 4527 members and an aggregate business of $1,130,719.29. The new organization reported for the same year a trade of $1,400,000. By the end of the decade both branches of The Union were practically defunct, and the local stores nearly all either closed, turned into ordinary joint-stock concerns, or were bought out by private parties. A few live on still under new names—*e.g.*, the stores in Worcester, Natick, New Bedford, etc.

This decade brought forth another ephemeral development of co-operation in New England in a series of loan societies. In 1852 The Suffolk Mutual Loan and Accumulating Fund Association of Boston was organized. It was followed by 9 similar societies in 1853, and by 16 in 1854. An act of the legislature was procured in this year to facilitate the incorporation of these associations. This movement assumed such promise that in 1857 the insurance commissioners of the State began to make special reports of its progress. The report for 1859 showed 36 associations in existence, which had made an aggregate of loans since their organization of $3,113,808.16.

The early years of this decade saw the very modest beginnings of a form of co-operative industry, quite novel, and destined later on to grow to large proportions. Following the example of a farmer in the western section of New York, a number of experiments were made after 1851 in the combination of dairy-work. Farmers living near each other brought their milk daily to a common dairy-house, where butter and cheese were made by skilled hands. The advantages of this system were at once apparent to those who tried it in the economy it secured and the excellent quality of the products it turned out. It was evident that there was needed only a general knowledge of this system to lead to the wide spread of cheese-factories and creameries which came in later years.

Late in this decade a local experiment was made in co-operative colonization, whose complete success ought to have had more influence than it seems to have exerted. In 1857 fifty poor workingmen of San Francisco combined to purchase a tract of land of upwards of a thousand acres in Los Angeles co., Cal. They placed the charge of it in the hands of the originator of the scheme. He laid out the settlement and worked it by hired hands, while the members of the colony went on in their trades. In three years he had the estate ready for occupancy, and the company located on it, each man in his allotted section. Anaheim continues still a successful village.

V. 1860–70. Fincher's *Trade Review*, a weekly paper, heartily interested in co-operation, records the evidence of the extensive agitation of the subject in this decade. Accounts of meetings for the discussion of the question, calls for lectures and for printed information, appear from time to time in its columns, amid notices of the formation of associations both for productive and distributive co-operation. Between 1863 and 1866 the *Review* notes the opening of 36 stores in different States. That the movement towards co-operative stores had gathered considerable force is evidenced from a call for a conference of New England store-associations in Boston to consider the creation of a wholesale agency, and from the suggestion of a similar conference of the representatives of the stores in New York State. A few of these stores appear to have had substantial strength. The Providence store within its first six months made sales of $600 a day. The Roxbury and Charlestown stores started with sales of $6000 each in the first week. Cheering reports came in from time to time of continued prosperity in some of these stores. The Chelsea store claimed total sales in its first year of $90,000. Along with these encouraging signs appear, however, brief notices of stores closing in various quarters. The *Trade Review* suspended in 1866, and the only general chronicle of the decade ceases.

Massachusetts reported officially in 1868 the existence of 12 distributive associations, having an aggregate capital of $47,000 and an aggregate membership of 1859. Other stores followed in this State before the close of the decade. An illustration of the soundness of some of these stores is found in the First Worcester Co-operative Grocery and Provision Store (1867), which has continued to the present date, doing a business of $75,000 in 1875, and reporting in 1881 a paid-up capital of $5000, with reserves of $1113.

A curious phase of co-operative distribution is found in this period in the "dividing stores" of Fall River, Mass. A little shop under this name was opened in a wooden shed belonging to a mill corporation in 1865, and so well patronized by the operatives that others followed quickly. They sold as near cost as possible, and of course therefore attempted to create no educational or other fund, as in the Rochdale store made so [illegible] the scheme. The purely

mercantile character of the system prepared the rapid collapse which the next decade showed.

Productive co-operation received various tentative essays in this decade, none of which seems to have attained much importance or to have secured long continuance. We find notices of foundries in Somerset, Mass., Albany, Cleveland, Cincinnati, Troy, and St. Louis; of ship-yards in Boston and Baltimore; of a cigar manufactory in Westfield, Mass.; of stove manufactories in Lynn and North Adams, Mass.; of a printing establishment in New York city, etc.

The associated dairies grew steadily and rapidly through this period. In 1866 there were 500 in New York State alone, where they originated, averaging 400 cows to a factory, aggregating 200,000 cows, worth $8,000,000, and bringing into use 1,000,000 acres of land, valued at $40,000,000. By the close of the decade there were 1313 cheese-factories in the country.

This decade witnessed a decline of the Loan Societies of Massachusetts, which had promised so well in the previous period. The report of the Insurance Commissioner of the State for 1864 gives 22 societies in working order; that of 1865 records 8; and that of 1866 can only show 3 in existence. Their plans seem to have been radically defective. Other States took up this line of effort. Ohio had a series of experiments in loan societies in the years immediately succeeding the war. These all followed the plan already becoming known for its successfulness in Pennsylvania.

In 1866 in Pennsylvania began the remarkable development of co-operative Building and Loan Associations, which has continued to the present time in steady progress, and which has created so large a factor in the wealth of the State. (See BUILDING ASSOCIATIONS.)

In this decade the application of the principle of mutuality to insurance, which had theretofore, with a few isolated exceptions, been confined to charitable and religious organizations, took on the business form in which it has continued to receive an ever-increasing development until it now enters as an important element into the business of the country.

V. 1870–80. The associated dairies grew during this decade into the immense proportions of the present time, as indicated in the next section.

In this period a great impetus was given to co-operation by the institution of national organizations having this as a chief aim. In 1871 the Order of the Patrons of Husbandry ("Grangers") was founded. A prominent object in its institution was the combination of the farming population for purchase and shipment in wholesale. Each local branch or grange was a purchasing club. The granges in a State united to support a general agent, who combined the orders of the scattered clubs, bought in large quantities directly of the manufacturer or wholesale dealer, shipped by the car-load, and thus dispensed with middlemen and reduced the rates of transportation. The business of these State agents was often very large. The agent of the Ohio granges reported in 1876 purchases for the preceding year of $965,906.70 for goods which at retail would have cost $1,206,632.11; a saving to the granges in the State of $240,725.40. The granges in large numbers opened local stores, which were generally conducted on the Rochdale plan. Educational influences were not overlooked. The granges met statedly to discuss economic and kindred social and political topics, and established circulating libraries, schools of agriculture, etc. No official records are published of the national organization, and private inquiry has failed to draw out accurate statistics of the growth and business of the order. Its growth for a few years was certainly very rapid, coinciding as the institution of the order did with the opening of the long-continued and severe depression in business experienced in this period. The grange papers in the height of the movement, about the middle of the decade, made imposing claims; *e. g.*, that the membership of the order in 1875 was 1,500,000; that the patrons saved $5,000,000 in 1873, $12,000,000 in 1874, and $20,000,000 in 1875. The order experienced a rapid shrinkage in the latter part of the decade, owing chiefly to the return of general prosperity, but accelerated by mistakes of semi-political action.

Another national organization, patterned upon the Patrons of Husbandry, but designed for others than farmers, arose in 1874—the Sovereigns of Industry. This organization made use of the method of club-purchasing which had effected such large savings for the grangers. The members of the local branches purchased at a certain store where a liberal discount would be allowed to such a combination. Flour they bought by the car-load. A system of purchasing agencies was early planned and partially set in operation, and a general distributing agency was opened in Chicago. Stores upon the Rochdale plan were started by the local branches. In 1875 Massachusetts had 15 stores with an aggregate capital of $27,974. By 1877 there were 29 stores reporting to the State council, 15 of which were joint-stock companies, and 14 of which were carried on upon the Rochdale plan, with total sales per month of $49,806, or per annum of $597,672. There were in addition 8 stores not reporting to the council, making a total of 37 stores in the third year of the order in one State. Accurate statistics of the national organization or the various State organizations are not accessible, if they exist. The growth of the order was plainly rapid. At the first annual meeting of the Massachusetts Council (December, 1874) 100 local councils were reported, having 10,000 members. The second annual council (December, 1875) reported 166 local councils, with 20,000 members. Other States probably did not equal this growth, as the order originated in Massachusetts. The address of the president to the national council in 1877 referred to 94 local councils, selected from the whole, which reported a membership of 7273, and which, with an average capital of only $884, did a business in the preceding year of $1,089,372.55. This was estimated to make a saving of $17 to every member of these councils after deducting initiation-fees and annual dues. This address conjectured that the unreported sales would swell the aggregate for the year to $3,000,000, which, at the same ratio of profit, would represent a saving to the order of $420,000. That the trade of the order was really large at this period may be inferred from the proposition made about this time to found a Co-operative Exchange under the title of the "New England Sovereigns of Industry Board of Trade." Some of the stores of this organization have been carried on to the present time. The Old Colony Co-operative Association Store, Kingston village, Mass., started in 1875, and in 1877 doing a business of $30,000, reported for 1881 a paid-up capital of $4,680. The usual reaction overtook this order in the latter part of the decade, helped on again by the returning prosperity of the country, and no revival appears to have taken place.

A third national organization came into existence in

this decade, seeking the development of co-operation in another line. The order of the Knights of Honor was founded in 1873 as a mutual insurance league. By the end of the decade it had attained very respectable proportions, having spread through about a dozen States and enrolled a membership of perhaps 75,000.

The growth of co-operation in this decade was not confined to these great national organizations. Towards the end of the decade a number of attempts at co-operative colonization were made, with few if any successes. Rugby, in Tennessee, was the most interesting of these experiments. The colony started with éclat, having a fine class of young Englishmen and noble ideals, but the ground was badly chosen and the young men mostly unused to pioneer life. Its organization has since been changed. The Co-operative Colonization Society, of New York, was an effort made to transfer workingmen from the overcrowded centres of the East to the West and South, and to plant them in well-ordered settlements by the same simple combinations which had made so signal a success of Anaheim. But the unusual drouth of 1880 sealed the fate of the first colony, which had been planted in Kansas, and the return of good times rendered it needless to renew the effort for the present.

Local productive associations arose in various parts of the country. In the mid year of the decade Massachusetts had 16 productive societies reporting to the State, and 9 not reporting. The 16 reporting societies gave an aggregate capital paid in of $114,210. Besides these 25 associations, others were known to be in existence, though not regularly incorporated. The industries represented were the manufactures of boots and shoes, furniture, chairs, cigars, gas, cotton goods, and printing, dairy-work, and foundry-work. Several of these societies are still in more or less successful operation.

Stores were started in different States—in Massachusetts, New York, New Jersey, Pennsylvania, Maryland, Ohio, Illinois, etc. Massachusetts reported in 1875 the organization of 15 stores since 1870, having an aggregate capital of $29,260. Other stores were known to exist, but did not report to the State. Eight societies reported total sales per annum of $500,000. Some of the stores of this period have achieved positive success, and live on thrivingly; *e. g.*, the Silver Lake Co-operative Association, and the Old Colony Co-operative Association in Kingston, Mass.; the Farmers' and Mechanics' Trading Company, Seneca Falls, and the Port Jervis Co-operative Association, Port Jervis, N. Y.; the Raritan Woollen Mills Co-operative Association, Raritan, N. J.; and the Neshannock Co-operative Society, Neshannock Falls, Pa. The most signal success has been that of the Philadelphia Industrial Co-operative Society, Limited. It started in 1875 with one store, and has now six stores—a main store, a store for boots and shoes, one for meats and provisions, one for dry-goods, and two branch stores. In 1882 its sales for the first quarter were $51,413.63, being an increase over the preceding quarter of $11,056.72. The gross profits for the quarter amounted to $4,516.52. It has now 1061 members. Most of the stores of this period, however, as of earlier periods, were short-lived. The dividing stores in Fall River, which started into existence in the latter half of the previous decade, attained considerable success for a few years in the early portion of this decade, and then declined rapidly, and for the most part disappeared. In 1874 there were 34 of these stores in Fall River, representing a constituency of 1200 families. The absence of anything in their organization contemplating higher than economic aims, as already hinted, proved their ruin. A firm of grocers from Boston opened a branch in Fall River in 1874, and by very low prices cut under the dividing stores completely. Having no other bond of union but cheapness, they mostly succumbed at once. By the end of the decade there were not over 10 stores left; there are now 7 remaining.

The loan and building associations of Pennsylvania grew in this decade astonishingly. The bulk of the societies now existent appear to have been organized in this period. Out of 163 associations reporting to the State in 1881, there were 120 whose date of organization lay within this decade. Massachusetts made a new essay in loan associations in this period, patterned upon the plan of the Pennsylvania societies. Four associations reported to the State in 1875, and by the close of the decade about a dozen were in successful operation. Ohio, California, and other States followed the example of Pennsylvania, in some instances to a considerable extent, New Jersey in particular rolling up a considerable array of such societies (106).

VII. *The Present State of Co-operation.*—The decade 1880–90 opened with increased interest and renewed activity in every line of co-operation.

The United States Census Report for 1880 gives the following statistics of the cheese and butter factories, which show results largely due to the system of associated dairies:

Number of establishments	3,932
Capital invested in the business	$9,604,503
Average number of hands employed { Males above 16	6,419
Females and children	1,484
Yearly wages paid	$1,546,495
Quantity of milk used, pounds	2,747,627,449
Value of all materials used	$18,263,579
Value of all products	$25,742,510

Concerning co-operative manufacturing we are left without any accurate knowledge. Few of the States have any official information upon the subject. Massachusetts reported in 1881 fifteen incorporated productive societies, representing an aggregate capital of $140,773.

The greatest success in this field of industry is that of the co-operative coopers of Minneapolis, who have eight shops in operation and employ two-thirds of all the coopers of that city, the oldest company having assets of about $50,000. In Milwaukee there is a flourishing co-operative society of plumbers, whose business in 1886 was over $70,000. At Lynn, Mass., is a successful co-operative boot and shoe factory. The St. Louis Furniture Workers' Association sold in 1887, the ninth year of its organization, goods to the value of $116,520, and paid in wages 3.421. Various other successful associations might be d. but the whole number at the present time is [illegible]

In co-operative credit there has been a [illegible] ing development. Pennsylvania has over [illegible] ing and loan associations, with assets of pre— [illegible] than $50,000,000, and 250,000 depositors, of than 40,000 are borrowers. In Philadelp[illegible] place of this class of associations, there [illegible] over 90,000 shareholders and 15.000 borr[illegible] the numerous associations the [illegible] of [illegible] more flourishing are given at [illegible] timated that 60,000 comfo[illegible]

built in Philadelphia through the aid rendered by these associations; that they have enabled 25,000 householders to pay off mortgages that would otherwise have probably been foreclosed, and that through the economical habits they have fostered $110,000,000 have been invested within the city limits. The example thus set by Philadelphia has now spread widely throughout the States. In October, 1886, there were in New Jersey 151 building associations, with 37,370 depositors and 8,562 borrowers, their total assets being $9,300,705. Massachusetts in 1887 had 51 associations, with assets of $4,211,648, the shareholders numbering 20,755, the borrowers 3,797; this indicating the building of new homes for some 20,000 of the population. In Hamilton co., Ohio—the county in which Cincinnati is situated—there were, in 1888, 340 associations, with about 60,000 shareholders and $15,000,000 assets. A gratifying growth of this system is reported from Western New York, Illinois, Missouri, Minnesota, and various other Western States, and to some extent in the South. California reported in 1882 16 societies, 11 of which had a capital of $1,808,304, earnings of $787,183, and total assets of $2,595,488, the membership being 29,947. Up to the date of 1882 the United States had over 3,000 such societies, and there has been a rapid growth since, though general statistics are not available.

Co-operative insurance is very largely developed. Churches engraft this principle, in the form of burial clubs, upon their work. The various labor organizations apply it among their members. Several well-established secret brotherhoods embody it; *e. g.*, the Free-masons, Odd-fellows, etc. New orders are arising with this aim in view. The Knights of Honor report 2400 lodges in 34 States, with a membership of 114,000. By January, 1882, this order had paid to heirs of deceased members upwards of $5,000,000. The Patrons of Husbandry have applied the co-operative principle to fire insurance very largely. In many States there are fire insurance societies connected with the granges in nearly every county. Some single societies are said to insure $1,000,000 of farm property. Several States are said to have successful life insurance societies in connection with their granges. Massachusetts reports, through her insurance commissioner, 140 mutual benefit associations of various kinds. As a pure business mutual assurance has assumed immense proportions.

Co-operative distribution is carried on to a considerable extent, though its growth has not been encouraging. The once flourishing society of Sovereigns of Industry has ceased to exist. The Grangers or Patrons of Husbandry are still in active existence. Many of their co-operative stores have failed, though some continue prosperous. Their largest store is that at Galveston, Texas, which in 1888 had a trade of $296,576 and 8,757 bales of cotton. This was an increase of $100,000 during the year. The union stores in cities have as a rule proved failures, largely through lack of skilful business management and an undue percentage of expense in handling. The entire co-operative distributive business in the United States was estimated in 1887 at between $5,000,000 and $6,000,000. This is small as compared with Great Britain, there being at the same date in England and Scotland 1,348 retail co-operative stores, with sales aggregating $111,718,255; yet the American output is increasing in an encouraging ratio.

This necessarily sketchy outline of the history of co-operation in the United States shows that its beginnings are much older, and its developments far greater than is usually supposed. It dates back to colonial times. It has attained a considerable volume in distribution, imposing proportions in banking and insurance, and a unique development in dairy farming. In the *Massachusetts Labor Bureau Report for* 1877 it is claimed that there had been through the past twenty-five years an annual investment in co-operative enterprises within that State of from $100,000 to $250,000.

Failures in abundance have marked the pathway of co-operation, particularly along the line of production. Some of the earlier periods have known little else than failure in every line. Nevertheless the movement has regathered its forces after every ebbing wave, has pressed on to its present gratifying reach, and seems now swelling towards far higher developments.

Authorities: *Reports of the Bureau of Statistics of Labor of Massachusetts; Reports of the Bureau of Statistics of Labor and Industry of New Jersey; Reports of Labor Bureau of Ohio; Reports of the Insurance Commissioners of Massachusetts; Report of the Secretary of Internal Affairs of Pennsylvania* for 1879–80; *Reports of the Bureau of Agriculture of the United States;* Noyes' *History of American Socialisms;* Fincher's *Trade Review; Reports of Texas Co-operative Association, Patrons of Husbandry,* for 1881; Reports of various local co-operative associations; documents and newspapers of the Patrons of Husbandry, Sovereigns of Industry, etc.; letters from officials in local co-operative associations and national organizations, and from private persons engaged in our earlier enterprises. (R. H. N.)

COOPERSTOWN, the county-seat of Otsego co., N. Y., is at the south end of Lake Otsego, on the Susquehanna River, 60 miles directly west of Albany. It is a terminus of the Cooperstown and Susquehanna Valley branch (16 miles long) of the Albany and Susquehanna Railroad. It has 2 national banks, 3 weekly newspapers, several hotels, 6 churches, 2 academies, and other schools. Two small steamers ply on the lake. J. Fenimore Cooper, the distinguished novelist, was a resident of this place, and died here in 1851. Population, 2529.

COOT, a kind of water-fowl. In New England the name is very inappropriately applied to those species of ducks (*Anatidæ*) which compose the genus *Œdemia*, three in number—*Œ. Americana*, the black scoter; *Œ. perspicillata*, the surf duck, and *Œ. fusca velvetina*, the white-winged scoter; all of which are known as "sea-coots."

See Vol. VI. p. 303 Am. ed. (p. 341 Edin. ed.).

The coots proper are lobe-footed-water fowl of the genus *Fulica*, sub-family *Fulicinæ*, and family *Rallidæ*, nearest related to the gallinules (*Gallinulinæ*), and through these connected with the rails proper. As in the gallinules, the bill extends upon the forehead as a horny plate or frontal shield, of varying size and shape in different species; the bill otherwise resembles that of the gallinules. But the coots are remarkably distinguished by their lobate feet, like those of Phalaropes, and less nearly like those of Grebes, whereby they are fitted to swim with the ease of ducks. To the same end the body is not compressed, but depressed and flattened beneath, with dense water-proof plumage of the under parts. The tail is extremely short, and generally carried cocked up. There are some ten or a dozen species of most parts of the

world, the horned coot of South America, *F. cornuta*, being the most remarkable. The N. American species (closely resembling the European *F. atra*) is *F. americana;* about 14 in. long; the wing 7 or 8; the tail 2; the tarsus 2; the middle toe and claw 3; the bill 1¼–1½ along the gape. The bill is white, a very small pointed frontal plate, this and a mark near the end dark reddish or dusky; the plumage is dark slate color, paler and grayer below, tinged with olive on the back, varied with white on the under tail coverts, edge of the wing, and tips of the secondaries; the feet dull olivaceous. It is one of the most abundant water-fowls of North America, migrating with great regularity in spring and fall, and breeding chiefly in northern regions. Coots are very generally distributed over the lakes and watercourses of the continent, but their favorite resorts, especially during the breeding season, are reedy pools and other stagnant waters where the vegetation is dense, as well as river-banks which off the same conditions for the concealment of the shy birds. The nest is a large heap of decaying reeds and other vegetation matted together, placed close by the water's edge or even in the water among the rushes, the foundations at least being usually water-soaked through. The eggs are eight to a dozen or fourteen in number, of rather elliptical than oval figure, clay-colored or dull creamy, profusely spotted and blotched with dark brown and neutral tints. The young take directly to the water: when first hatched they are curious objects, pitch-black striped in the most fantastic manner with orange-red. Coots are generally found in flocks in the fall and winter; the flesh is fit for the table, though not very highly esteemed. They are commonly known as "mud-hens;" in some sections as "flusterers," from the difficulty they seem to experience of rising on wing from the water; they are also called "white-bills." The habits of other species are substantially as here described. (E. C.)

COPE, Charles West, an English painter, was born at Leeds in 1811. His father was a landscape painter of some merit, and gave him his earliest instruction in art. After his father's death Cope studied at the Royal Academy, and then spent two years in Italy. On his return he exhibited an Italian landscape at the Royal Academy in 1831, and his picture of The Holy Family attracted much attention. In 1843 his cartoon, Trial by Jury, gained a prize of £300, and in the same year he was elected an associate of the Academy, becoming an academician in 1848. In the fresco competition of 1844 his Meeting of Jacob and Rachel was successful, and, being commissioned to prepare a fresco in the House of Lords, he took as his subject Edward, the Black Prince, receiving the Order of the Garter. For several years he was engaged on frescoes in the Peers' Corridor in the Houses of Parliament. This series of eight paintings illustrates the reign of Charles I., four showing memorable events on the royalist side, and four on the parliamentary side. In these Mr. Cope has been eminently successful both in composition and execution, and some of his oil-paintings, as The Departure of the Pilgrim Fathers, treat of the same subjects. Besides historical paintings he has executed a large number of domestic pieces, as The Young Mother and Maiden Meditation, painted in 1847; Fireside Musings and The First-born (1849); Creeping to School (1852); Baby's Turn (1854); Evening Prayer (1860); Two Mothers (1862); Scholar's Mate (1862); Home Attraction (1875); Hope Deferred (1877). Among his historical pieces may be noted Last Days of Wolsey (1848); The Children of Charles I. (1855); Parting of Lord and Lady Russell (1861). Some of his works are illustrations of scenes from Shakespeare, as King Lear and Cordelia (1850); Shylock and Jessica (1867); Othello Relating His Adventures (1868); Anne Page and Slender (1875); Bianca's Lovers (1878). His etchings have also been highly esteemed. He retired from work in 1883.

COPE, Edward Drinker, an American biologist and geologist, was born in Philadelphia, July 28, 1840. He belongs to a Quaker family which has long been eminent in that city for enterprise and public spirit. His grandfather, Thomas Pym Cope, an eminent merchant, was frequently called by his fellow-citizens to fill public positions of responsibility. He was also noted for his philanthropic labors, and was for many years president of the Mercantile Library. Alfred Cope (1806–1877), son of Thomas, inherited the business talent and charitable disposition of his father. He assisted in establishing an institute or high school for colored youth in Philadelphia and the Free Library in Germantown. He also presented to the city of Philadelphia a tract of land now included in Fairmount Park. Edward, son of Alfred, was taught in private schools and studied medicine in the University of Pennsylvania. He was for some years professor of zoology and geology in Haverford College, Pa., and curator of the Academy of Natural Sciences, Philadelphia. He became the geologist and palæontologist of the U. S. Geological Survey of the region west of the 100th meridian under Lieut. G. M. Wheeler, and palæontologist of the geological survey of the Territories under Dr. F. V. Hayden. In connection with these surveys he explored, in 1871, the eastern Kansas, then occupied by hostile Cheyenne Indians; in 1872, the Bad Lands of South-western Wyoming; in 1873, the Cheyenne country in North-eastern Colorado; in 1874, North-western New Mexico; in 1877, Western Texas; in 1879, the Bad Lands of Central Wyoming; in 1881, Eastern New Mexico. He has also made explorations parties to other regions of Western North America, to Honduras, Peru, and Brazil. The extent and importance of his explorations is one of the finest collections of extinct vertebrate fossils in America. In the report of the Wheeler survey he published *The Vertebrata of the Tertiary Formations of the West* and *New Mexico* (1877). In the report of the Hayden survey he has published three volumes on the Vertebrata: *Vertebrata of the Cretaceous Formations, of the Tertiary and Mesozoic Formations, and of the Post-Pliocene Deposits of Colorado* (1882). In these volumes he has described for the first time 1000 species of Vertebrata, which represent families and orders previously unknown. He has also published a *Synopsis of the Extinct Batrachia, Reptilia and Aves of North America* (1870). Besides these works he has published nearly three hundred papers, and has reconstructed the arrangement of Fishes, the Batrachia, and in part that of Reptilia and Mammalia. He has also contributed to the philosophy and theory of evolution, and, while following Lamarck and Herbert Spencer, has suggested principles that have been generally adopted: the law of acceleration and retardation, of the origin of species, of the location of growth-force under the law of archæothetism. He is a member of the Academy of Sciences and of many other societies in America and Europe, and one of the editors of the *American Naturalist*.

COPPÉE, François Edouard, a French poet and dramatist, born in Paris

ed poetical pieces of merit at a very early age, employed upon the compilation of the *Parnasse contemporain*, which appeared in 1866. In the ear he published a small collection of poems en- *Le Reliquaire*, which was followed in 1868 by an- alled *L'Intimité*. In a later volume (*Poèmes es*) were two pieces, "La Bénédiction and "La des Forgerons," which were read publicly and d with great favor. The first is of a pathetic at the capture of Saragossa in 1809, and the describes the strike of the iron-workers. He early to write dramas which were adapted to the *Le Passant*, which was acted in 1869, became very popular and largely increased his reputa- In 1870 he produced *Deux Douleurs* and *L'Aban-* which did not add to his fame, but his next effort, *que dois*, was received with enthusiasm, as was *Les Bijoux de la Délivrance*, founded upon an in the Franco-Prussian war. With the collab- of M. D'Artois he wrote *Le Petit Marquis*, a rama, which, without being published, was pro- at the Odéon. *Le Luthier de Crémone* ("The ker of Cremona"), presented at the Théâtre in 1877, was also eminently successful. Many ieces and collections were crowned by the French ny. Among his later poetical productions are mbles (1872), *Le Cahier rouge* (1874), *Olivier L'Exilée* (1876), and a romance called *Une pendant le Siège*. The poet was a favorite of on III., who gave him a position in the library Senate at the Luxembourg. In 1878, upon the of M. Guillard, he was appointed archiviste r of the records) of the Comédie Française. He a member of the Legion of Honor. A complete of his poems and plays in five volumes appeared *Petite Bibliothèque Littéraire* in 1870–79. This s three volumes of *Poésies* written between 1864 78, and two volumes of his dramas, produced be- 1869 and 1872. His prolific pen is constantly to these. He is the poet of French humanity triotism; his themes are of general interest to all ; his thoughts are high and pure, and his style gly simple and unaffected. He avails himself ching incidents which appeal to our common ity, and his little stories carry their moral with o be clearly discerned by the most casual reader. ; these are *Le Liseron* ("The Climbing Vine"), te de la Sultane ("The Head of the Sultana"), ufragé ("The Shipwrecked Mariner"), *L'Araignée Mahomet* ("The Spider of Mohammed"). eatest living poet of France, except perhaps Vic- , he unites the fervor of that great writer with ommie of Béranger and the simplicity of La ne. His career has been one of development, e world may confidently expect greater works is pen. (H. C.)

'PEE, HENRY, an American soldier and histo- rn at Savannah, Ga., Oct. 13, 1821. After a at Yale College he entered the Military Acad- West Point July 1, 1841, and in 1845 he was ted and promoted as brevet second lieutenant in ond Artillery. He served in the war with Mexico, 3, being engaged at the siege of Vera Cruz, in tle of Cerro Gordo, in the skirmishes of La nd Oka Laka, in the battles of Contreras and Chu- . the storming of Chapultepec, and the assault) e of the City of Mexico. Promoted to a first in the First Artillery on Aug. 20, 1847, he brevet of captain on the same day for "gal- lant and meritorious conduct in the battles of Contreras and Churubusco." After the war he was ordered to West Point in the department of instruction, where he remained for seven years, the greater part of the time as principal assistant professor in the department of Ethics and English studies. In 1855 he resigned from the army to take the chair of English literature in the University of Pennsylvania in Philadelphia. This post he held until 1866, when he was elected president of the Lehigh University at Bethlehem. After ten years he retired from the presidency to take the chair of English literature and history, which he now holds. He is the author of the following works: *Elements of Logic* (1857), *Elements of Rhetoric* (1858), *Grant and his Campaigns* (1866), *English Literature considered as an Interpreter of English History* (1873). He was, during the Civil War, editor of the *United States Service Magazine*. In 1861 he issued two collections of poetry, entitled *A Gallery of Famous Poets* and a *Gallery of Famous Poetesses*, and also in 1866 one of sacred poetry, called *Songs of Praise in the Christian Centuries*. In 1875 he edited an English version of the *Guerre civile en Amérique* of the Comte de Paris. In 1880 he published a *History of the Conquest of Spain by the Arab-Moors*, in two volumes.

COPPER has been found in the United States in workable quantities not only in nearly the entire belt penetrated by the Appalachian chain of mountains, but also far to the West thereof. Among the States and Territories most favored in the geological distribution of copper deposits are Arizona, California, Montana, Michigan, Colorado, Idaho, Maine, Maryland, Missouri, New Mexico, North Carolina, Pennsylvania, Vermont and Wisconsin. The world's yield of ingot copper was, in 1888, 259,778 tons, of which the United States yielded two-fifths, its product having grown immensely of recent years. In 1882 the total product of this country was 90,819,447 lbs.; in 1887 it was 182,227,331 lbs., and in 1888 231,270,622 lbs., of a total value of $33,833,954. This yield comes nearly wholly from Michigan, Montana, and Arizona, though many other States and Territories yield a small share of the grand total. The product of Arizona went up from 17,984,415 pounds in 1882 to 31,797,300 in 1888, while Montana made the great advance from 9,058,284 pounds in 1882 to 97,897,968 in 1888, and Michigan from 64,014,460 pounds in 1882 to 86,472,034 in 1888. The Calumet and Hecla mine, on the shore of Lake Superior in the last named State, is the most productive copper mine in the world. In 1880 the yield of this mine was 31,675,239 lbs. By 1886 its product had risen to 50,518,222 lbs., and it has continued to increase.

See Vol. VI. p. 308 Am. ed. (p. 347 Edin. ed.).

The copper product of Great Britain has, meanwhile, declined, so far as its own mines are concerned, the yield having fallen from 15,968 tons in 1860 to 1,386 tons in 1886. Yet there is a large product from imported ore, the total yield from native and foreign ore in 1887 having been 57,503 tons. As regards the centres of the American copper product, in Arizona the principal districts are the Warren, in which the Copper Queen is the leading producer; the Clifton, in which the Arizona Copper Company and the Detroit Copper Company together represent the total product; and the Globe district, in which the Old Dominion Copper Company is the leading mine. All of them work comparatively high-grade oxidized ores easily smelted in blast-furnaces, the product being a

black copper containing from 95 to 97 per cent. of metal. In Montana the centre of the great new district is Butte City. The ores, chiefly complex sulphides, are rich in copper. The fact that they are contaminated with arsenic is more than compensated for by the presence of notable, though varying, quantities of silver. They are better paid for in England than at home, and the bulk of the rich ore, and the matt, obtained by concentrating and smelting the lower-grade ores, is exported to that country. In Michigan, in the Lake Superior district, the metal is found as native copper. The heavy masses of copper in these places are imbedded in azoic rock, and small veins ramify in all directions. It occurs in bodies of almost every size from small grains to masses weighing ten tons and upwards. This native copper is frequently found to be mixed with silver in distinct fibres, the latter not being alloyed with the copper. Native copper has also been found in the ore veins of New Jersey, Pennsylvania, Arizona, and New Mexico. The following table shows the product (refined copper) of the Lake Superior region for several years past:

Year.	Tons.	Lbs.	Value.
1871 and previous.....	139,756,	118	$70,198,774
1872	12,276,	1523	7,979,400
1873.....	15,045,	1505	8,726,100
1874.....	17,166,	1389	8,009,356
1875.....	18,019,	1497	8,180,626
1876.....	19,135,	997	7,998,430
1877.....	19,513,	671	7,327,888
1878.....	20,845,	1266	6,920,540
1879.....	21,425,	1529	7,327,350
1880.....	24,869,	367	9,947,673
1881.....	27,270,	909	9,971,702
1882.....	28,577,	1980	10,522,416
1883.....	30,000,	...	10,000,000
Total.....	386,916,	450	$173,110,255

That the Lake Superior copper region was known to a prehistoric race is evident from the remains which still exist of gangways, tools, and other proofs of skill which the races occupying the country at the time of its discovery nowhere evinced. The Indians found by the white explorers are believed to have been utterly ignorant of the methods of working that had been in use by the former race; they had no traditions to explain the existence of the numerous excavations, and what native copper they possessed was only such as they gathered among the surface stones. The first record of the deposit is found in the missionary report of the Society of Jesus for 1660. The occurrence of copper was one of the objects that early attracted the attention of the Jesuits, and its presence among the Indians naturally excited their curiosity and wonder. The savages had rude utensils made from the metal, and huge blocks of it were worshipped among their gods. But long prior to this period the metal that attracted the attention of the missionaries and the early *voyageurs* had been sought and mined by a people who have left no record but the implements which they used and the excavations which they made. Yet their work remained concealed from the white race until the country was thrown open to settlement and actual mining had begun. That this earlier mining work is of great antiquity is evident from many facts; the pits and tunnels which had been made had become filled up with rubbish and with decayed vegetation, and overgrown with forest trees. If the depressions were ever observed they were naturally regarded as those made by overturned trees, or as hollows in the rocks, until the discovery was actually made so late as 1847 that here, too, men had formerly delved in search of metals. These ancient excavations are found in all portions of the Mineral Range and in Isle Royale. There is scarcely a vein or outcrop of mineral in the whole copper district of Michigan where evidences are not found of their ancient workings, sometimes extending sixty feet into the solid rock. In these pits have been found large masses of copper which these primitive miners had unsuccessfully endeavored to remove. Masses of copper of many tons in weight have thus been discovered surrounded with stone hammers in great numbers, pieces of burnt wood and other evidences of former labor. The method of mining which these people apparently pursued was to heat the rock by fire, and then by pouring on water and pounding the rock with their stone hammers to disintegrate and separate it. The stone hammers found in these ancient pits consist of small boulders of hard-trap rock of from three to thirty pounds in weight, around which a groove was sometimes made for the purpose of holding a withe which fastened on the handle. In the copper district these pits of the ancient miners, extending along the surface outcrop, have undoubtedly been of great service both as guiding to the discovery of lodes and giving indication of their value. The first systematic attempt at modern mining in this region was made by Alexander Henry, an educated Englishman, who explored the country in 1763, and in 1770 established, as the agent of an English company, some works on the Ontonagon River, about 20 miles above its mouth. The attempt, however, did not prove successful, and the works were soon after abandoned. The true mining era of the region begins only with the year 1844. The possession of this country known as the region of Lake Superior as a portion of the territory of the United States is said to be due to Dr. Franklin, who, while in Paris, during the American Revolution, became acquainted with the reports that had been made concerning the existence of copper along the margin of the Great Lake. Subsequently in arranging the treaty with England, in which American independence was acknowledged, Franklin drew the boundary line so as to include the south shore of Lake Superior within the limits of the new nation.

Prior to the admission of Michigan as one of the States of the Federal Union, that Territory claimed, as a portion of its domain, a strip of land bordering on Lake Erie, in which was included the present city of Toledo, Ohio. The right of possessing this parcel of land was insisted upon by the State of Ohio. The matter coming before Congress on the application of Michigan to become a State, that body passed an act admitting her into the Union upon condition that she should relinquish her claim upon the disputed territory, receiving in lieu of the disputed land the isolated region now known as the Upper Peninsula. A convention, acting upon the matter in December of the s
year, reluctantly accepted the proviso, and Ja
1837, Michigan was admitted into the U
northern peninsula has since proved to be
most valuable regions within the li s of
domain. Its mineral wealth
and almost incredible. Its iron o
richness, and it possesses native
dance found in no other country.

No efforts were made to
tion of Michigan prior to

of 1819 Gen. Lewis Cass, then Governor of the Territory, made a tour of inspection, which included the south shore of Lake Superior. The especial purpose of the expedition was to determine, as far as possible, the truth of the reports regarding the mineral value of the country. The party entered the mouth of the Ontonagon River, with a view of finding the famed "copper rock," where Alexander Henry had attempted to start his works. With great difficulty the party finally reached their destination, and found the object of their search. The rock had evidently been visited frequently, as the marks of pounding, many cuts, and the broken tools strewn about, plainly showed. This mass of native copper, which, up to the time of its removal, was the largest known in the world, was in the spring of 1842 taken to the mouth of the river, and soon afterward sold to the U. S. Government. It was then transferred to the grounds of the War Department, at Washington, where it still

In 1841 Dr. Houghton, having been appointed geologist of Michigan, submitted to the State ... ire his report, in which the geological features ... country were ably outlined, and which gave to ... world the first definite information regarding the ...per veins and the character of the deposits. His ... ements drew public attention to the country, ... a short time thereafter the influx of explorers, ...ctors, and speculators began. The first operations were undertaken under grants from the War ...partment, which issued about 1000 permits, and ... locations were actually made. Very many of these ... were made along the Keweenaw peninsula, ... portion of the country became the seat of the ... mining work. The mineral range begins at ... w Point, trends westerly a distance of about ... miles, and thence southwesterly, and is characterized by the occurrence of a broad belt of greenstone ... crystalline trap, which forms the southern ... nt in this portion of the range. This green... formation terminates near the south line of the county, and does not again appear throughout the further prolongation of the mineral range. Both north ... ith of the greenstone are numerous amygdaloid ... , which are crossed by the fissure veins, and which ... lly carry a greater or smaller percentage of copper. ... ue earlier period of copper-mining on Lake Superior the fissure veins yielding copper in masses gave to the country its celebrity, and the ones which proved the productive lie south of the greenstone—an im... nt geological feature of this region being the fact ... what is known as the great copper-bearing belt of ... w co. lies immediately south of the green... pitches beneath it.

The first mining shaft was sunk on the lake at Copper Harbor in 1844. In the following year the celebrated vein on which is located the famous Cliff mine was discovered on the Eagle River. This mine, with a total paid-in capital stock of $110,905, from 1848 to 1870 not only sustained the expenses of the company, but also paid to the stockholders the net sum of $2,627,660. In the year 1881 there were thirty-... ee mines of Lake Superior copper, whose yield ... to 74,549,708 lbs.

... y all the veins which are worked, and which ... t trap ridge, contain mass copper, and ... are continu y bei raised from them. ... has been taken out ... in 1857, which ... and 470 tons.

Its length was about 45 ft., its height 22 ft., and its greatest thickness 8 ft. Some of the masses taken from the Phœnix mine, one of the oldest on the lake, were from 4 to 5 ft. thick and composed of solid copper. The Cliff mine has yielded masses weighing from 100 to 150 tons in one piece. One of forty tons was taken out in 1879, beside numerous blocks weighing from one to eight tons.

As it is not possible to break out such huge masses of metal when they are found by drifting upon the course of the vein, the following method of extraction is employed: A narrow passage or chamber is excavated upon one side of the mass, laying bare as much of the surface as possible. If it cannot be dislodged now by levers, the excavation of a second chamber behind the mass is resorted to. This last excavation is made large enough to contain from five to twenty or more kegs of powder. In the Cliff mine one charge of twenty-one kegs of powder threw down 200 tons of copper. Bags of sand are used for tamping, and the drift is closed up by a barricade of refuse and loose earth. After such a blast the drift is, of course, charged with foul air, and cannot be safely entered for hours afterwards. The huge masses of copper dislodged in this way are too heavy to be brought to the surface entire; the mass is therefore marked off in squares or blocks of suitable size, and so cut up. This is done by the copper-cutters. Copper-cutting is a distinct art, and requires considerable skill and experience and long training. The tools used for this purpose are simply narrow chisels and driving hammers. The chisels are shaped like the parting tools of turners. They are made of flat bars of half-inch steel, about 2 in. wide and 18 in. long. They are chamfered each way like a cold chisel, to form the cutting edge.

The mass mines have entirely lost their early importance, only a small part of the product of the lake being obtained in this form. Probably 90 per cent. of the copper made is from low-grade ore crushed in stamps.

The native copper ores of Lake Superior, which at some mines are worked profitably even when they contain less than 1 per cent. of copper, are crushed almost exclusively first in rockbreakers, any masses found being sorted out, and are then delivered to stamps. The type of the latter, developed in the region and peculiar to it, is similar to a direct-acting steam-hammer. The majority in operation are those modelled on the general design introduced by Ball, though recently important modifications of it by Mr. E. D. Leavitt, Jr., has increased its capacity while lowering its fuel consumption. On conglomerate rock the Ball stamps crush 160 tons per day, while the Leavitt heads have made monthly averages of 235 tons per day. In these stamps the particles of copper are released from their matrix of rock, and after their discharge from the mortar are separated from it by the usual methods of concentration, by utilization of their greater density, in jugs and luddles. The resulting product, called "mineral," contains from 60 to 80 per cent. of pure copper, and is smelted and refined in reverberating furnaces.

Copper-Smelting.

The *smelting of copper ores* is a metallurgic operation of great complexity, owing to the great variety of ores presented for treatment. Thus, a smelting process adapted for copper pyrites must contain provisions for the removal of arsenic and sulphur, which are not present in the carbonates and the oxides of

copper, so that the processes of smelting are arranged in such a manner that these ores, as well as the slags obtained in some of the operations, can be introduced after the sulphur and the arsenic have been expelled.

The extraction of copper from its ores consists in: 1st. *Roasting processes* for the purpose of expelling arsenic and sulphur, and for converting the iron contained in the ore into oxide of iron. 2d. *Melting processes* for the purpose of effecting the solution of the oxide of iron with silica at a high temperature, so as to obtain the copper in the simple combination of sulphide of copper; and 3d. *Process of roasting and melting* in a single operation, for the purpose of expelling the sulphur and obtaining metallic copper.

Copper-smelting proceeds as follows: (1) Before being brought to the roasting furnace or *calciner* the ores are broken up in small-sized pieces and assorted so that the charge may contain about ten per cent. of metallic copper, proper attention being paid in the mixing also to the *gangue* or earthy matters associated with the ores so that they may serve as fluxes to each other. The *calciner* is a *reverberatory* furnace, with a large hearth (14 by 16 feet) to allow of the ore being spread out in a thin layer upon it. At one end of the hearth near the fire-place is a flue for the admission of the air necessary in the roasting process. The charge for each calciner is about 3 tons of the broken ore, which is spread out evenly over the hearth and roasted for 12 hours, being occasionally raked over, so as to expose fresh portions to the action of the air and to prevent any part of the ore from being melted. At this temperature the arsenic in the ore combines with the oxygen, and forms *arsenious acid*, which passes in the form of vapor into the flues. About half the sulphur in the ore also combines with the oxygen and passes up the chimney as *sulphurous acid* gas. A large portion of the iron is converted into oxide of iron, and the small quantity of sulphuric acid which is also formed remains in the ore as sulphate of copper.

(2) From the calciner the ore goes next into the *ore-furnace*, which is also a reverberatory furnace, but its hearth is much smaller than that of the calciner (about one-third) because the charge has to be made at a much higher temperature. In this the melting for coarse metal is effected, for which reason the hearth is slightly inclined on all sides towards a depression at one side, which serves as a crucible in which the melted coarse metal collects. The charge of this furnace is composed of

Calcined or roasted ore about	18 cwt.
Ores containing oxide of copper and silica	3 "
Metal-slag containing oxide of iron and also some oxide of copper and silica	6 "

The slag is the first to fuse (about one-half hour after the charge is made), and by degrees the whole mass becomes liquid. The disengagement of sulphurous acid gas causes violent ebullition, which favors the intimate mixture of the melted matters on the hearth. After three or four hours the melted mass is mixed with a rake and the temperature considerably raised, so as to effect the separation of the coarse metal from the slag. Half an hour thereafter the tap-hole is opened and the *matt* of coarse metal is run out into an iron box, perforated at the bottom, and standing in a cistern through which water is constantly running; the coarse metal is thus *granulated* preparatory to undergoing the next operation. Sometimes the matt (also called *regulus*) from two or three operations is allowed to accumulate in the furnace before tapping, the slag alone being raked out before the introduction of a fresh charge. This *ore-furnace-slag* is run into sand moulds where it solidifies into blocks, which are used for rough building purposes in the vicinity of the works. The purpose of the second process is to remove the oxide of iron, into which the iron sulphide contained in the pyrites had been converted by the first process. This is effected by causing a combination of the silica with the oxide of iron, to form a compound capable of being melted and separated from the ore. The coarse metal obtained in the matt contains copper, iron, and sulphur in about the same proportion in which they are present in pure copper pyrites, so that the copper amounts to about 33 parts in 100, or nearly four times the proportion contained in the raw ore at the commencement of the first process.

(3) This coarse metal is next returned to the calciner, and 3 tons of the granulated matter is roasted for 24 hours, the temperature being moderated at the commencement to avoid fusion, and gradually raised in proportion as the removal of the sulphur diminishes the fusibility of the charge, which is raked over about every 2 hours. About one-half of the sulphur is again converted here into sulphurous and sulphuric acids which escape in vapor, so that roasted coarse metal consists essentially of sulphide of copper, oxide of iron, and some unchanged iron [illegible].

(4) This calcined coarse [illegible] furnace which does not ma[illegible] ployed in the second proc[illegible] cavity in the hearth which is [illegible] to sl[illegible] towards the tap-hole. The c[illegible] co[illegible] calcined coarse metal with [illegible] Ox[illegible] finery slag, and ores containi[illegible] copper. These materials are [illegible] to[illegible] 6 hours, when they divide as before and a slag which remains above it. [illegible] *metal-slag*, and its appearance is [illegible] the ore-furnace-slag. It is usually [illegible] of the charge in the second pro[illegible] The matt resulting from this [illegible] run out into water (as in the c[illegible] when it is called *fine metal*, co[illegible] cent. copper, and considerable [illegible] into pig-moulds of sand, when it [illegible] its surface being a bluish color, [illegible] sulphide of iron. When it is int[illegible] *best selected copper*, the blue me[illegible] of sand-moulds. The pigs which [illegible] most impure, because the impurities [illegible] mass tend to collect at the bottom. [illegible] yield *bottoms* or *tile-copper*, so called [illegible] of the ingots, and the subsequent [illegible] give[illegible] *selected* copper.

(5) The pigs of blue m[illegible] t el reverberatory furnace (1½ [illegible] to [illegible] e [illegible] they are roasted at a gradual[illegible] so as to avoid fusion (for abo[illegible] pose of converting part of the s[illegible] [illegible] oxide of copper. Next the [illegible] re raised, the doors of the fur[illegible] e [illegible] access of air, and the [illegible] a violent effer[illegible] [illegible] in [illegible] owing to the [illegible] sulphur[illegible] the union of [illegible] sulphur in [illegible] oxygen from the oxide of c[illegible] copper subsides in a [illegible] sand-moulds. [illegible] the purity of t[illegible]

suming from 12 to 24 hours. A small quantity of slag —called *roaster-slag*—is formed during fusion; it contains about 16 per cent. of copper and is used as a portion of the charge in the fourth process. The ingots or pigs from this process have, when solidified, a blistered appearance, owing to the escape of sulphurous gas while cooling; hence the term *blistered copper*. Blister-copper contains from 95 to 98 per cent. of pure copper, the remaining impurities being sulphur, arsenic, iron, tin, lead, and other foreign substances.

(6) The removal of these impurities is the object of next process, called refining. The furnace emred for this purpose is similar to the ore-furnace. charge consists of from 6 to 8 tons of blister-copx. piled upon the hearth in such manner as to allow to circulate freely among the ingots. A moderate applied at first, to allow the oxygen to act upon , which reaction is facilitated by the porous ıre of the ingots. The chemical effects of this ıe same as in the previous processes of calcina- After being roasted for about 6 hours, the metal lted, when a thin layer of slag is formed upon its e; this slag is raked off, which operation is *rabbling*, and, when finished, a small test-ingot ıawn and examined by the refiner, who decides by the appearance of the fracture upon the ess of the material for *poling*. This is done by ring the surface of the metal with charcoal, which wed from time to time, so as to shield the copıom further oxidation, and the melted metal is ed with a pole of green wood, until a sample, ı broken, shows a fine silky fracture and light red and, when hammered hot, is found to be soft and ıom cracks at the edges. The copper is then said ıe at *tough-pitch*, and it is ready to be ladled out ast into the requisite shapes.

effect of poling in toughening the metal deupon the complete deoxidation of the copper. the operation of casting, the surface of the he hearth be not well covered with charcoal, will *go back* or become brittle again from sorption of oxygen from the air. The slag ed from the surface of the metal before poling ued *refinery-slag*, and consists almost entirely of ide of copper and silica. It is used in the charge ıe fourth process in smelting. The refineries in United States use throughout the reverberatory e for this process, except the Ansonia Brass and Copper Company of Connecticut, which has adopted emens' regenerative furnace of twelve tons capacity this purpose. As previously stated the metal is not tapped in the refining furnace, but is taken out in ın ladles lined with clay and poured into iron moulds. efined copper is cast into three different forms, viz.: *ingots*, *bars*, and *plates*. The ingots vary in weight from 13 lbs. to 18 lbs., and are only used for remelting, d as qui v as the copper has *set* in the ingot-mould ve reversed and the copper dropped into a tank filled with water. This is done to preserve its bright appearance, as it would turn black if cooled in contact with the air. The ingots are cast with two inıtations to facilitate their breaking up in smaller es for remelting. Bars are cast in sectional moulds on a slight angle, and vary in weight from 60 lbs. to l , and more, according to the purpose for which ard Great care must be taken that the process ıe ıe continuous, as otherwise the bar would In casting plates, a *bottom-plate* or *tile* varying from ½ in. to 1 in. in thickness is poured first, to separate any impurities which the copper may still contain; such impurities settle at the bottom. Then, on top of this, three more plates varying in thickness from 1¾ in. to 2½ in. are cast successively in the same mould; the separation of these different layers being effected by simply interrupting the pouring long enough to allow the copper to take a slight set. The standard weight of plate ingots is about 150 lbs., though much larger ones are cast for specific purposes. During the process of ladling and pouring, frequent tests are made, so as to keep the molten mass up to tough pitch.

The Copper Syndicate.—A recent event in the financial history of copper is of sufficient importance to be chronicled. This was a vigorous French speculative movement, induced by the great decline in the price of copper, which fell from over $400 per ton in 1870 to less than $200 in 1887. Instigated by this, the French *Société des Métaux*, which had control of the great Rio Tinto mines in Spain, and handled vast quantities of copper, formed a syndicate for the purpose of buying up all the copper in the market, controlling mining shares, and then raising the price of the metal. In 1887 this company made a "corner" in Chili bars. Then, backed by powerful financial institutions, particularly the *Comptoir d' Escompte*, the syndicate made a vigorous effort to control the world's copper supply by buying up and holding the whole product of the mines, offering an advanced price as an inducement to the mining companies. This bold scheme required an outlay of 225,000,000 francs yearly, but they hoped, by their power of controlling the price, to repay themselves fully. Unfortunately for their purpose, the advanced price offered stimulated mining enterprises, and new productive mines were opened. On the other hand, consumers refused to pay the advanced price—using instead old copper and replacing copper by iron and steel where possible. In the early months of 1889 the syndicate held 160,000 tons of copper, for which no market could be found at the advanced price demanded. As a consequence the company fell into financial difficulties, and a pressure was made on the *Comptoir d' Escompte* bank, their principal backer in the speculation. The feeling of distrust was increased by the suicide of M. Denfert-Rochereau, the manager of the bank, who was principally responsible for its embarking in the perilous enterprise. Eventually the bank was saved from failure by the aid of the other banks of Paris, but the effort of the great copper syndicate ended in disaster, and copper returned to its natural price. The sustaining banks still hold a large stock of copper, which they are gradually placing upon the market.

American Consumption.—The consumption of copper in the United States is remarkably great. Out of its immense product only a small percentage is exported, and the width of its application has been greatly increased. There is reason to believe that the consumption of metallic cartridges alone in the United States is equal to the total consumption of copper by any other nation. The demand for copper wire for electrical purposes has grown immensely, and very large quantities are now used in this industry. Other applications are for clocks, ornamental hardware, household appliances, etc. Under these circumstances, and considering the richness of the Ameriean ores, the extent of our copper-working industries is not surprising, one firm alone, the Ansonia Brass and

Copper Company, using a considerable percentage of the total production of the United States. Foremost among the manifold industrial applications of copper must be counted the manufactures of copper plates, bolts, tubing wire, rivets, and burs, seamless tubing, electric wire, and phosphor bronze goods. The facility with which copper unites with almost all other metals has made possible the large extent of its use in the arts. The most important of copper alloys is the commercial brass consisting of copper and zinc.

Brass.

Brass is made in plumbago crucible pots, holding from 75 to 100 lbs., and consists of copper and zinc, or spelter as it is called commercially, in the average proportion of two parts of copper to one part of zinc; this proportion being more or less varied in accordance with the purpose for which the brass is made. Each pot is set in a separate pot-hole, and the time required for melting varies with the mixture, the zinc being added shortly before the end of the process. When the fusion is complete, the pot is lifted out by a crane, and the metal quickly covered with charcoal, to prevent the volatilization of the zinc. The mass is then allowed to cool somewhat, is next raked off, and then poured into sectional iron moulds.

See Vol. IV. p. 195 Am. ed. (p. 217 Edin. ed.).

One of the principal causes of an increased demand for the copper in the United States is to be found in the sudden impulse given to the manufacture of ornamental brasswork, for the decoration of modern houses. The use of brass in decoration has so very much to recommend it that it is becoming more and more popular. The copper used for the purpose by most of the New York foundries comes principally from the shores of Lake Michigan, in the shape of ingots. The most ordinary piece of ornamental brasswork passes through seven processes before it is ready for sale. After the design has been furnished, a cast is modeled in plaster of Paris, and it then passes to the moulder, who casts it in metal. The filer then works upon it and rids it of all imperfections and unevennesses, when it is ready for the chaser. If the article consists of various parts, they are now brazed together with hard solder and forwarded to the filer once more, and then to the polisher and colorer. The production of what is called "shell-bark" is more elaborate. The copper is first cut in sheets and placed over the chuck, or block, on a lathe, and as the lathe revolves, a workman with a steel instrument molds the metal into the required shape until it is perfectly fitted on the chuck. The highest rate of speed is necessary in thus welding the brass on to the model, and lathe and chuck revolve with the greatest rapidity. In this way knobs and balls of brass are made; such, for example, as form the base of chandeliers or the top of pedestals. The ornamental open work with which we are familiar upon the chains of chandeliers, or that which has the appearance of half-relief, is made by a still more difficult process, known as half-scouring.

Embossed sheet brass is used for finger plates to doors, for panels, and for the decoration of flat surfaces in almost every position. Brass plaques shine resplendently upon the walls, hammered brass salvers replace those of silver or electroplate, and in domestic utensils of almost every kind brass is used to some extent. The revival of the art of sheet brass repoussé work is partly due to the encouragement given to pupils in a school established in Philadelphia by Mr. C. G. Leland. Some of the most beautiful decorative brass articles are the popular accompaniments of the grate—andirons or fire-dogs, for example. These are now made in every variety, expensive and inexpensive, merely upright posts ornamented by a ball or by a sunflower, or by elaborately carved images of animals. Another form of brass ornamentation is the fender with its twisted bars and radiating knobs, as costly in its way as the ordinary cut-brass fender is inexpensive.

Lamps are formed with spiral columns of burnished brass, surmounted by a globe. The brass used in chandeliers is lacquered, or polished with a fine composition, which gives it additional lustre, but would not stand very frequent polishing. Every possible combination of porcelain and brass ornamentation is found in gas fixtures and fittings. Frames of wrought iron, or of ebonized or carved wood, are fitted with the finest brass wire, which is almost as fine as spun silk, and which is often very beautifully decorated with a centre of repoussé work. Embroidery is mounted in frames of hammered brass, and beautiful effects are produced by its introduction in the fitting of colored glass for medallions, circlets, screens, and even mosaic window margins.

Phosphor-Bronze is composed of copper, tin, and phosphorus. The proportion of these ingredients depends upon the purposes for which the bronze is intended, the amount of tin varying from 3 to 15 per cent., and that of the phosphorus from ½ to 2½ per cent. This alloy is principally used in mining- and marine-pumps, bolts for locomotive-boilers, etc., as it is found to resist oxidation or corrosion from water impregnated with sulphur, salt, and other mineral substances, which soon destroy brass rods.

As will be seen from the table of Imports and Exports, but a trifling amount of manufactured or refined copper is imported into the United States. The reason for this is found not only in the superior richness of American ores and improved methods of manufacture, but also in the duty imposed on foreign copper and copper manufactures. The revenue duties at present collected are—

On copper ores, 3 cts. per lb. of all contain; and on copper regulus, copper, 4 cts. per lb. on all fine co… The same duty is levied on … manufacture. Copper in pl… pings, etc., pays 5 cts. per lb. … rods, pipes, wire-rods, and all all … gives the chief value, a duty of 45 per c… is collected.

Although the cop… the l… is increasing yearly, … have risen apace with … western matts, which were fo… eastern smelters, have of late b… at the rate of 1,400,000 noun… is no reason to fear … market which could … the pre-eminence of the …

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COQUELIN, Benoit-C… and author, was born at B… father was a baker, and he … trade; but he felt called to … rents entered him at the Pa… and Declamation, where he … 1859, into the class of M. F…

of French comedians and an admirable teacher. Having taken a second prize in comedy, he made his first appearance at the Théâtre Français as Gros-René in Molière's *Dépit Amoureux*, on Dec. 7, 1860, less than a year after he had entered the Conservatory. Aided by the kind counsel of his instructor, M. Regnier, who was one of the most influential members of the Comédie Française, M. Coquelin soon made his mark as a humorous actor from whom much might be expected. He acted all the chief comic characters in the classic comedies, and he had a few taking parts in new pieces. His success was such that in 1864, when he was not yet twenty-three years old, he was elected an associate. Since then his powers have been steadily expanding and his reputation has been rapidly growing, until now he is clearly the first comedian of France. Outside of the old comedies, in which, as we have seen, he has acted most of Molière's own parts in the theatre which Molière founded, he has "created," as the French call it, important characters in Théodore de Banville's *Gringoire* (1866), in Manuel's *Ouvriers* (1869), in Ferrier's *Tabarin* (1871), in Coppée's *Luthier de Crémone* (1876), and in Lomon's *Jean Dacier* (1877)—all poetic plays, most of which owed much to his suggestions. Of late his four greatest successes have been as the Duke in the *Étrangère* of M. Alexandre Dumas *fils* (1876), as Léopold in M. Augier's *Fourchambault* (1878), as the Préfet in M. Pailleron's *Monde, où l'on s'ennuie* (1881), and as Florence in the *Rantzau* of MM. Erckmann-Chatrian. This list shows the extraordinary range of M. Coquelin's histrionic capacity. He has the double faculty of compelling at will smiles or tears; and he has in addition the gifts of dignity and of poetry. His Duke in the *Étrangère* is a high-bred rascal, corrupt and depraved to the backbone, but true to his inherited nobility in spite of his worthlessness. His Gringoire is a beautiful picture of a starving comic poet sacrificing his love with real heroism. His Jean Dacier is a brave and tender soldier of the Revolution. His Florence is a garrulous and kind-hearted old schoolmaster. All these characters are radically different, and demand an extraordinary versatility, yet it is in these that M. Coquelin has succeeded amply, although he is perhaps even better in the richer comic parts of Molière. His Mascarille, for example, in the *Étourdi*, is an ideal picture of a quick-witted, light-fingered, loud-mouthed, long-winded rascal. His Vadius in the *Femmes Savants* is the model of a dull pedant, empty and emphatic, and with a lack-lustre eye. Equally admirable in humor and in pathos, in broad farce and in poetic drama, in dignified characters and in brainless pedants, M. Coquelin has attained a position on the Parisian stage while still a young man which has rarely if ever been held by an older comedian.

In 1870 he did his duty in the army; he has always been a sincere republican; and he was perhaps the closest personal friend of M. Gambetta. He has many intimates among the leading painters and poets of Paris. He has done much for the younger poets, delivering their stanzas with admirable appreciation and urging them to fresh effort. To him more than to any one else is due the present French fancy for reciting verse. Of M. Coquelin on the evenings he is not acting has d now and again as a lecturer. His first effort vindic n of his profession; this was published the ti of *L'Art et le Comédien*, and an Eng- by Miss Alger, called the *Actor and his* . has been issued in this country. Later are two n the *Misanthrope* and the *École des Maris* of Molière; and he has now in hand a series of literary portraits of the younger poets, of which the lecture-essays on M. Eugène Manuel and M. Sully-Prudhomme have already appeared.

During the visit of the Comédie Française to London M. Coquelin was the greatest favorite among the actors of that incomparable company; and he has since utilized his vacations by acting again in London with abundant success, and by making trips through the chief countries of Europe. He left the *Théâtre Français* in 1886, appeared in London in 1887, and in 1888 made a successful tour in the United States.

His younger brother, ERNEST COQUELIN, generally known as Coquelin *cadet*, was born in 1848; followed his brother to Paris, and was admitted to the Conservatory in 1864; took a first prize in comedy in 1867; acted for a while at the Odéon; and in 1868 made his first appearance at the Théâtre Français. During the war he was a soldier like his brother, and won the military medal at Buzenval. He acted for a while at the Variétés, but returned to the Théâtre Français in 1876, and in 1878 was elected an associate of the Comédie Française. He is a broadly comic actor of farce. Although he has played more elevated parts with effect, it is as a droll, as an exponent of pure fun, that he has been most successful. Following in his brother's footsteps, he has popularized monologues of much breadth of comic effect. He has published a little essay on the monologue and two collections of jests. (B. M.)

COQUIMBO OR LA SERENA, a city of Chili, capital of the province of Coquimbo, on a river of the same name, 1 mile from the ocean and about 240 miles N. of Valparaiso. It is connected by a railway with the port of Coquimbo, 7 miles distant. It is regularly built, and is one of the most beautiful towns of Chili. It is a bishop's see, and has a fine cathedral, several churches and convents, a priests' seminary, 2 branch banks, a hospital, and copper-smelting works. Many of the residences are surrounded by gardens. Copper is the chief article of export. In 1875 the population was 12,293. The port of Coquimbo (Puerto Coquimbo, population 5077) has one of the best harbors in Chili.

CORACOID (Gr. *κόραξ*, a raven, *εἶδος*, form), one of the bones of the scapular-arch, or shoulder-girdle of vertebrates. In man and other mammals, excepting *monotremata*, the coracoid is reduced to a mere process of the scapula or bladebone, being consolidated therewith, and does not reach the sternum; the name is derived from its fancied resemblance to a crow's beak. In birds the coracoid is a large, stout bone, of constant character, always distinct from the scapula, articulating with the sternum, taking part in the formation of the socket for the head of the humerus, and serving to bear the shoulder-joint firmly away from the breast. In ratite birds the axis of the coracoid is coincident, or nearly so, with that of the scapula; in other birds the two bones meet at an angle, usually less than a right angle. (E. C.)

CORCELLES, CLAUDE FRANÇOIS PHILIBERT TIRCUIR DE, French diplomatist and deputy, born at Marcilly d'Azergue, department of Rhone, June 22, 1802. His father was a deputy who voted with the extreme Left, and fiercely opposed the restoration of the Bourbons and the monarchy of July. The son was elected to the Chamber of Deputies in 1837 by the arrondissement of Sécz (Orne), where he took part with the independent liberals under the leadership of De Tocqueville. He was also an ardent Roman Catholic. He was much interested in questions of na-

tional economy and in Algerian affairs. After the revolution of February, 1848, he again had a seat in the Chamber, and supported Louis Napoleon. He joined the French expedition to Rome, and worked to restore the authority oft he pope. After the *coup d'état* of Dec. 2, 1851, he retired from politics until the downfall of the Empire in 1870, when he returned to the legislature. In 1873, he was sent as an ambassador to Rome, and remained until 1876.

CORCORAN, WILLIAM W., American philanthropist, was born at Georgetown, D. C., Dec. 27, 1798. He entered into the banking business in Washington in 1823, and pursued it with great success, negotiating various Government loans. His most noted gift to the city of Washington was the Corcoran Art Gallery. The building for this gallery, begun in 1857, was used during the war for the quartermaster's department. After the war it was completed, at a cost of $1,500,000, and enriched with one of the finest collections of works of art in America. In 1847 he presented Oak Hill Cemetery to Georgetown, and in 1870 founded the Louise Home, for indigent gentle-women of tender rearing. He died at Washington, Feb. 24, 1888.

COREA, called Chō-sen or Tsio-sen ("morning calm") in the native language, consists mainly of a peninsula, having the Yellow Sea on its W. and the Sea of Japan on the E. The W. and S. coasts of the kingdom are lined by countless islands —the Corean archipelago, of which only one island, Quelpaert, is large or noteworthy. The N. E. horn of the Yellow Sea is known to geographers as the Gulf of Corea. The S. W. entrance of the Sea of Japan is called the Corea Straits. The name Corea was formerly official. It originally belonged to a now extinct minor state in the N. W. part of the peninsula, and from the eleventh till the fourteenth century, A. D., it designated the whole country. The name comes to us from the Japanese, through the Portuguese. The area of the kingdom is about that of the State of Minnesota. The Corean coast-line is said to measure 1740 miles. In the main, the eight provinces (*dō*) of Corea correspond pretty closely to the principal river basins of the country.

See Vol. VI. p. 346 Am. ed. (p. 390 Edin. ed.).

The *climate* of Corea is not unlike that of the Atlantic coast of the United States in corresponding latitudes. Among wild animals, besides numerous tigers, boars, and bears, monkeys are found in large numbers, and alligators are not unknown. The height of the mountains modifies the climate, which appears to be more rainy and much less mild than that of the neighboring empire of Japan. As in Japan and China, southern forms, both in animal and vegetable life, prevail, reaching latitudes much colder than might be looked for from comparison with the flora and fauna of other parts of the world.

The *people* of Corea are of composite origin. There is probably a large Aino or Ghiliack element among the common people. The language, in its radical elements, is decidedly akin to the Japanese, but it is much less euphonious. Dravidian affinities, as well as likenesses with the monosyllabic languages of Indo-China (themselves presenting surprising likenesses to Dravidian speech), are easily traced. The Chinese elements in the Corean are also very copious, being probably in part the common inheritance of the two nations; but in a large degree the Chinese has been directly engrafted upon the Corean stock, since in Corea the Chinese has always been the principal literary language. There are two ways of writing Corean, one by means of a regular and excellent phonetic alphabet, and the other by a syllabary (also phonetic) of 129 characters. Chinese characters are used to some extent as logograms.

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and for the aged, valor in war, and love

Recent History.—In 1876 Japan,
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for several months. More recently the King has sent ministers to the United States and the principal nations of Europe. A fanatical outbreak against foreigners took place in Seoul. the capital, in 1888, incited by a Chinese report that American missionaries kidnapped Corean children, and boiled them down to obtain a preparation to use in photography. It was put down without serious damage. In the same year the teaching of the Christian doctrines was forbidden by edict. Yet in the Royal College of Corea, and in the hospital and medical school, both under American direction, the Western sciences and literature are taught. Under the influence of Mr. Denny, the American adviser of the King, Corea has shaken off the old Chinese control and entered on an independent career. The population is estimated to be 10,518,837.

CORINTH, the county-seat of Alcorn co., Miss., is at the intersection of the Memphis and Charleston Railroad with the Mobile and Ohio Railroad, 93 miles E. by S. of Memphis. It has a courthouse, a bank, 2 weekly newspapers and 2 monthly magazines, 7 churches, 2 seminaries, and some schools for colored children. At the outbreak of the Civil War in 1861 it was a growing village, and in the next year became noted as the scene first of a siege, and afterwards of a battle. It was then reduced almost to a waste, but has since recovered, and is a railroad town of some importance. Population, 2109.

I. *The Siege of Corinth.*—After the severe battle of Pittsburg Landing, April 6 and 7, 1862, Gen. Beauregard, commanding the Confederate army, retreated to Corinth, the strategic point, in defence of which the battle had been fought. He summoned reinforcements from every direction, and seemed ready to defend Corinth to the last extremity. He had of effective troops between 50,000 and 60,000. Gen. Halleck left St. Louis to assume command of the Federal army in the field April 9, and reached Pittsburg Landing on the 11th, bringing with him large reinforcements. Of his army, a little more than 100,000 strong, the left wing was under the command of Maj.-Gen. John Pope; the right under Maj.-Gen. George H. Thomas, and the centre under Maj.-Gen. Don Carlos Buell. Maj.-Gen. McClernand commanded the reserve. Gen. Grant, by title second in command, seems to have fallen under Halleck's displeasure, and having no command of troops, had also but little voice in council. He had, however, just before Halleck's arrival, sent an expedition up the Tennessee to Eastport to destroy the railroad bridge over Big Bear Creek, east of Iuka, and cut off communication in that direction with Richmond.

Halleck advanced upon Corinth with great caution. Though the weather was excellent, the roads good, and a vigorous pursuit ending in a prompt and vigorous attack might have at once destroyed the Confederate army, six weeks were consumed in marching fifteen miles. The rupture of the first strategic line, running through Columbus and Bowling Green, by the fall of Fort Donelson, had thrown the Confederates upon a second line, of which Corinth was a vital point, and the capture or forced evacuation of Corinth would cut this new line from east to west, and force them upon a third running from Vicksburg to Mobile. The topography of Corinth greatly favored its defence; and the nineteen miles of distance from Pittsburg Landing, so cautiously traversed, gave the Confederates ample time to avail themselves of these advantages. It covered "Grand Junction," forty miles to the west, where the Memphis and Charleston Railroad is crossed by the Mississippi Central, from Halleck's advance. The town is enclosed between two creeks, and the ridges beyond forming an irregular cincture of about 15 miles, were strongly intrenched, and mounted with guns. The Grand Army of the Tennessee, which had moved so cautiously, at last reached Corinth. Thomas's right wing consisted of four divisions; Buell's centre corps had also four divisions; and Pope, who came up from Island No. 10 and New Madrid, to take part on the left, had 25,000 men. The latter general sent a detachment of one division under Gen. Paine to Farmington, which was held by a force of 4500 men under Gen. Marmaduke. This force did not wait for the Federal attack, but with hardly a show of resistance retired rapidly into the inner defences of Corinth, May 9. Beauregard at once sent a force of 20,000 men on this day to recover Farmington. Pope's advanced brigade was vigorously attacked by Van Dorn in front; and Price was to make a simultaneous attack on the flank, but failed to appear. However, Pope was driven out, and the Confederates again occupied Farmington. The first vigorous and effective movement of the Federal troops was made from their right by Gen. W. T. Sherman on Russell's house, which stood upon an elevation about a mile from the intrenchments. This was taken by a force under Gens. Denver and M. L. Smith, and strongly fortified. The main line of Halleck, concentric with the enemy's works, was about three miles distant. The railroads had been cut in rear of Corinth at Purdy and Glendale. On May 27 Col. W. L. Elliot was sent with two regiments of cavalry to destroy the railroad east of Iuka, which he did effectively. Everything was now ready for a general assault by the Federal army. On May 28, three strong reconnoitring columns, one from each of the three grand divisions, were pushed towards the town; and Sherman, from his point of vantage, moved forward and captured a house only one thousand yards from the intrenchments. On May 30 Pope opened with his batteries, but it was soon manifest that the enemy was evacuating the town. Indeed, Beauregard had issued orders of evacuation on the 20th, and everything had been ready to begin the retreat on the 26th. But it was postponed until June 1, on the morning of which day smoke and flames announced to the Federal army that the town was abandoned. Beauregard was in full retreat; the Federal troops marched in without apparent gain; but it was in reality, however sagaciously planned, a Confederate disaster. By the loss of Corinth, the second great line in the South-west was broken, and the Confederates were thrown back upon the third and last through Vicksburg, Jackson, Meridian, and Selma. Beauregard fell back upon Tupelo, and Halleck did not long pursue him.

On August 11 Halleck was called to Washington to the command of the entire army. Pope was promoted to the command of the new Army of Virginia; Buell was put in march towards Chattanooga; Gen. Grant was restored to the District of West Tennessee, with his headquarters at Memphis; the Army of the Mississippi was confided to Gen. Rosecrans, but Grant was now to defend with greatly diminished numbers—four divisions having been withdrawn from the Army of the Tennessee—the new strategic line of railroads which the Confederates had lost, from Memphis to Iuka. He was in person eight weeks at Corinth watching

Van Dorn and Price. On the other side Beauregard was relieved of his command by Bragg.

The link between this siege and the battle of Corinth is found in the complicated movements around the town of Iuka. Grant, who was watching the Confederate forces concentrating to attack him, learned that Price had come from the south to cross the Memphis and Charleston Railroad at or near Iuka, 21 miles east of Corinth; that he would make a feint to reinforce Bragg and to follow Buell, then marching upon Nashville, and would try to lure Grant out of Corinth or attack him there. Col. Murphy, who occupied Iuka with a small garrison, evacuated the town with such haste as to interfere with Grant's plans. It was now necessary for him to move a larger force on Iuka and beat Price, and then return rapidly to Corinth and beat Van Dorn's detachment, which was four days' march distant from Price. He sent Rosecrans with 9000 men by way of Rienzi to Iuka to attack Price from the south, and Ord with 8000 by way of Burnsville to make a similar demonstration from the north. The nature of the country and the difficulty of communicating orders caused the combined attack to fail. Price attacked Rosecrans vigorously, and was then able to retreat in good order and join Van Dorn to take part in the new assault upon Grant at Corinth.

II. *The Battle of Corinth.*—Upon the retreat of Price from Iuka Grant made ready to receive their attack. He went to Jackson for a short time, leaving Rosecrans in command at Corinth with about 20,000 men. They comprised Hamilton's division of two brigades; Davies' of two; Stanley's command of nine regiments, and a brigade under McArthur; with these were ten batteries. McPherson also joined Rosecrans with a brigade before the attack. The large scale upon which the defences of the town had been constructed by Beauregard was now greatly reduced to suit the diminished numbers of the garrison. Captain T. E. Prime, of the Engineers, laid out an inner line of intrenchments with batteries onthe north front, enfilading the Bolivar and Chewalla roads, and also making a good cross-fire. Reconnoissances in force were sent out for some miles, but were soon fighting in retreat. On Oct. 3, Van Dorn came up the Chewalla road, driving the Federals with great impetuosity, and ranged in the centre, Price taking post opposite the Federal right, and Lovell opposite the left. The entire number of men was 28,000. Finding an interval between McArthur and Davies, the enemy pushed in, causing the latter general to fall back a thousand yards. So satisfied was Van Dorn with this day's work that he sent despatches to his superiors announcing a complete victory.

The next morning, just before day, the enemy attacked along the whole line, and the fighting was desperate. The columns of Price, Lovell, and Van Dorn were led by Villepigue, Rust, Maury, and Hébert. But the Federal artillery was admirably served, and the enemy's guns were soon silenced. About 9 o'clock Price made a vigorous attack on the right centre by the Bolivar road, although it was swept by the guns from the town. It is styled by the Confederate historian Pollard as "rash and magnificent." Their impetuosity carried a portion of the attacking party into the town, but the fire of inner batteries drove them out again. A similar attack was made on the left centre by Van Dorn; the column was driven back, came forward, was hurled back again and again, until at last, under the concentrated fire of double-shotted guns, they gave way to return no more. They began a most disastrous retreat, were pursued across the Hatchie—forty miles by an infantry force, and sixty by cavalry,—and were struck in the flank and scattered by Hurlbut and Ord. Never, after such valorous attacks, had there been a more signal discomfiture and ruinous retreat. The Confederate loss in this battle was 1423 killed, 5000 wounded, 2225 prisoners, 14 colors, and 2 guns. The Federal army lost 315 killed, 1812 wounded, and 232 prisoners. (H. C.)

CORK is the bark of the matured cork-oak (*Quercus suber*), an evergreen oak, which grows principally in the south of France, Algeria, Spain, Portugal, and in Tuscany. The tree is barked for obtaining the commercial product, cork, when the tree is about twenty-five years old; for although it sheds its bark naturally prior to this age, the product thus obtained has no commercial value. Where the tree is indigenous to the soil the inhabitants use cork extensively for many and varied purposes. Thus in Spain, beehives, kitchen-pails, pillows, etc., have been made out of it; in Morocco, drinking vessels, plates, tubs, and house-conduits; in Portugal, roofs for houses, lining for garden-walls, and fences for poultry-yards. The chief objection to using the wood is that it warps very easily, and cannot be obtained of sufficient length for most purposes. It is used for piles and in ship-building for curved pieces, which are kept under water, and is then fastened with copper bolts, as iron bolts cannot be used on account of the tannin in the wood. The wood is reddish-brown, and has a density when dry of from 0.787 to 1.560.

See Vol. VI. p. 356 Am. ed. (p. 402 Edin. ed.).

The cork tree requires a warm climate, yet it is found in Spain at an altitude of 1600 feet, and in Algeria at 3200 feet. The lowest average annual temperature at which it flourishes is about 60° Fahr. It grows best on siliceous soils, and on slopes where it has abundance of light and free circulation of air. Its blossoms appear in April or May, and the fruit ripens in the following autumn, though on some trees the acorns remain till December or January. In plantations cork trees continue to grow and be of service for their bark for two hundred years, though some authorities advise that trees 150 years old be cut down to make room for young ones. The tree varies greatly in size. In Spain it attains a maximum height of 60 feet, the trunk having a girth of 10 or 12 feet. In Algeria it reaches a height of 65 feet, the trunk measuring from 11 to 16½ feet in circumference.

It has only been within the present century, and indeed since 1850, that the importance of the cork crop has been appreciated in Spain; but now it is in some provinces reckoned one of their chief sources of wealth. It is now valued at eleven times its price in 1790. As the demand for stoppers increases daily, the cork plantations rise steadily in value.

The cork for commerce is obtained in the following manner: an incision is first made through the bark around the tree near the ground, and another similar cut close to the branches. These cuts are followed by others equally deep, made longitudinally, and dividing the bark into broad planks. The tree is then left; the sap has been stopped from circulation; the bark begins to dry and to curl outward, and shortly each strip is peeled off by hand. The tree is not killed by this process, which may be repeated every ten years, or in some places every seven years. There are two methods of preparing the bark for the market. By the first method, the *tables*, as the broad strips of bark are

called, are heaped one upon another, their concave sides downward, in deep trenches, and being plentifully moistened are pressed beneath huge bowlders till thoroughly flattened out. They are then dried carefully before large fires, being turned constantly till quite dry and perfectly flat, when they are ready for the market. By the second method the damp pressure in the pits is dispensed with, the tables being simply laid with their convex sides toward the fire, and suffered to remain until their warp is lost and they become flat. The bark is inspected and assorted according to size and quality. The inferior portion, after the crust is burned off, is sold mostly for floats, whence it receives the name of fishing-cork. The first and sometimes the second coats of corks are useless for making stoppers.

The better qualities of cork are first boiled and scraped, and then blackened over a coal fire, the object being to make the surface smoother and to conceal flaws. After being forwarded to the warehouse the largest slabs are cut into pieces of about 3½ feet in length, 18 inches in width, and ranging from ½ inch to 3 inches in thickness; for exportation the cork is next dried and packed into bales of 150 pounds each.

In the United States after the cork is received at the factory it is again assorted, and then thoroughly steamed in a chest designed for the purpose: the latter process softening the cork and rendering it easy to cut. Corks are made by hand and by machinery. If made by hand the cork-cutter uses a knife, which has a very thin and sharp blade about six inches long. This blade is tapering toward the point, which is truncated. It is constantly whetted upon the board from which rises the stake on which the cork rests during cutting. The cork is made in a tapering form by two semi-circular cuts.

One of the most improved machines for cork-cutting is the *Armstrong machine*. The cork-slab is passed from the bale upon an iron table, which is secured by lugs to a wooden table. The slab is then held against a wooden guide or gauge, which regulates the width of the strips into which it is to be cut by moving it up to a circular steel blade, which revolves like a circular saw, but has a sharp edge and the bevel all on the outside so that the cork cannot jam. The cork-strips thus obtained pass next to the cork-cutting machine proper, which has a hollow spindle driven by a pulley fixed at about the middle of its length. This spindle is capable of moving horizontally back and forward in its bearings in the two standards placed on either side of the pulley. On the right-hand end of the spindle is a flange, which runs in the groove of a lever by which the end-motion of the spindle is controlled. At the other end of the spindle is a hollow cylindrical cutter of fine steel, with a cutting edge at its end produced by bevelling off the outside. Through the hollow spindle, and reaching nearly to the end of the cutter, runs a fixed rod held by a set screw. Opposite the cutter-edge is a tail-block, the upper part of which is made of hard wood. A gauge-bracket is fastened in front of this block by means of a screw and nut, and the whole of the block is adjustable by means of a screw-handle. The operation of the machine is as follows: the operator places a strip of cork with his left hand upon the gauge-bracket in front of the tail-block, then with his right hand pulls toward him the lever which controls the end-motion of the hollow-spindle: the revolving cutter is thereby brought up against the cork-strip and forced through it. The operator then moves the right-hand lever back again, and the revolving spindle withdraws the cutter, carrying the cut cork in its bore. As soon as the fixed rod inside of the hollow-spindle before mentioned meets the cork it pushes it out and the cork drops. The machine has a capacity of 250 gross per day, and when once set the operator has merely to feed the cork-strips with the left hand, and operate the cutter-spindle by moving it forward and backward with the right hand.

To taper the corks they are fed by hand in a horizontal position down an inclined trough to a plunger, which operates vertically, and brings the cork up and against the flat end of a rapidly revolving lathe-spindle, which imparts to it a rotary motion. A steel blade revolving at a high speed is now traversed over the top of the revolving cork, cutting it taper and of the requisite diameter from end to end at one cut.

An ingenious cork-cutting machine is also that of M. A. Robert. The sheet of cork is first cut into square blanks approximating the finished cork in size. These are fed down, one at a time, between vertical guides, and descend upon a table, where they are met by a clamp, which grasps them and pushes them forward between spindles, the under one of which is spiked and the upper one toothed. While held in these the cork is rotated on its vertical axis against a swiftly moving hand-saw blade about two inches in width. This blade is constantly in motion, and in order to keep it sharp a horizontal grindstone is provided. The stone is actuated at intervals by a cam-wheel, driven by a worm and pinion from the main shaft, so that at every revolution of the latter the grindstone is brought into contact with the blade and rotated for a few seconds.

The cuttings from the different machines are utilized in the manufacture of *cork-board* by being ground and incorporated into paper pulp in mixing machines, and with powerful presses. The material is highly elastic, very light, and a non-conductor of heat and sound. Other uses for cork-cuttings are indicated in the *Encyclopædia Britannica*.

(A. F. H.)

CORLISS, George H., a mechanical engineer and manufacturer, was born in Easton, Washington co., N. Y., June 2, 1817. He completed his education at an academy in Castleton, Vt. His inventive genius first manifested itself in constructing a machine for sewing boots, shoes, and heavy leather, but up to the age of twenty-four he never had seen the inside of a machine-shop, nor, with the exception of the sewing-machine, had he ever exhibited any marked inclination for invention. In 1844 he took up his residence in Providence, R. I., and soon after associated himself in business with John Barstow and Edwin J. Nightingale under the name of Corliss, Nightingale & Co., for the manufacture of steam-engines. It was here that he began the development of his inventions of improvements in steam-engines, and in 1848 he completed and successfully set in operation an engine which embodied the essential features of what is known the world over as the "Corliss engine." During the same year the present works of the Corliss Steam-engine Company, in Providence, were commenced. They have a capacity for employing 1000 men—a statement, however, which fails to show the magnitude of the establishment, so effective are the labor-saving appliances introduced, most of which were devised by Mr. Corliss himself. His letters patent for improvements in steam-engines were granted March 10, 1849.

The great service Mr. Corliss has rendered the world through his inventions is recognized by the awards made to him by the highest scientific authorities. In 1867, at the Paris Exhibition, he carried away the highest competitive prize, although there were in competition more than one hundred engines. The late Mr. J. Scott Russell, the distinguished English engineer, who was one of the British commissioners to this exhibition, in his official report thus speaks of the Corliss engine: "The American engine of Corliss everywhere tells of wise forethought, judicious proportion, sound execution, and exquisite contrivance." In 1870 the Rumford medals of the American Academy of Arts and Sciences were awarded to Mr. Corliss; in presenting which Dr. Asa Gray said that "no invention since Watt's time has so enhanced the efficiency of the steam-

engine as this for which the Rumford medal is now presented." In 1873 the award of the grand diploma of honor from the Vienna Exhibition was a distinction exceptionally noteworthy, from the fact that Mr. Corliss had sent neither engine nor machinery there, nor had he any one to represent him. Foreign builders had sent engines claimed to be built on his system, and placed his name on their productions. Hence the jurors awarded to Mr. Corliss "the diploma of honor" as "a particular distinction for eminent merits in the domain of science, its application to the education of the people, and its conducement to the advancement of the intellectual, moral, and material welfare of man." In 1879 the Institute of France bestowed upon Mr. Corliss the Montyon prize, which in the Old World is the highest honor known for mechanical achievements. In 1872, Mr. Corliss, under an act of Congress providing for the celebration of the one hundredth anniversary of American independence, was appointed a commissioner for the State of Rhode Island at the Centennial Exhibition in Philadelphia, and was chosen one of the executive committee of seven who were entrusted with the preliminary work. The great engine furnished by Mr. Corliss for this exhibition increased his already world-wide fame. The cost of this undertaking exceeded $100,000. Prof. Radinger of the Polytechnic School of Vienna, pronounced this engine one of the greatest works of the day.

This engine has been transferred to the town of Pullman, near Chicago, where it furnishes the motive-power for the extensive works of the Pullman Car Company. The latest efforts of Mr. Corliss were directed to the adaptation of his engine to the pumping machinery of waterworks, and he achieved unprecedented practical results. The king of the Belgians made him an officer of the Order of Leopold in 1886. He died at Providence, R. I., Feb. 21, 1888.

CORMORANT (Lat. *corvus marinus*, "sea-crow;" Span. *cuervo marino;* Fr. *cormoran*), a large heavy web-footed water-bird of the order *Steganopodes;* family, *Phalacrocoracidæ;* genus, *Phalacrocorax* and its subdivisions: related to Pelicans, and especially to the Snake birds or Anhingas (*q. v.*). As in all of the order the feet are totipalmate, all four toes being united by full webbing; the body is very stout; the neck long; the wings short; the tail large, fan-shaped, composed of 12 or 14 very stiff strong feathers denuded to their bases by reason of the shortness of the coverts; the bill is about as long as the head, stout or slender, terete, hooked at the end; the external nostrils are usually obliterated in adult life; the gape deep, reaching below the eyes, which are set in naked skin continuous with the covering of the bill; there is a small naked throat-pouch, of the same character as that which attains such enormous size in the pelican. The far backward position of the legs compels the cormorants to stand nearly upright, like loons or grebes; they are birds of heavy but powerful flight, and often pursue their prey by flying under water, like loons. Their food consists chiefly of fish, of which they devour enormous quantities, their voracity being proverbial. The plumage as a rule is glossy black, with peculiar metallic tints, and on the back a special arrangement by which each feather has a distinct edge of color, and therefore appears scale-like; but all the species do not present these features. Most species develop in the breeding season curious curly crests, or other filamentous feathers on the back or flanks, these special featherings being deciduous. The eyes are green as a rule—a color rarely seen in the eyes of birds. Cormorants inhabit all parts of the world; and though found on various inland waters and along low shores, they more particularly haunt rock-bound coasts, where they congregate in the breeding season in countless numbers, laying their eggs in rude bulky nests on the ledges of cliffs, or even on the bare rock; the filthiness of their rookeries is simply indescribable. The eggs are generally two in number, sometimes single or triple, narrow and elongate, thickly covered with a white chalky incrustation, beneath which is the pale greenish shell proper. The young are hatched naked and helpless, requiring to be assiduously nourished for a long period; they are fed by regurgitation of the macerated contents of the parents' stomachs into their open mouths.

See Vol. VI. p. 361 Am. ed. (p. 407 Edin. ed.).

There are about twenty-five species, seven or eight of which inhabit North America. 1. The Common Cormorant (*P. carbo*), of the Atlantic coast, is the same as that of Europe. This is one of the largest, with 14 tail feathers, and the throat-pouch heart-shaped; the length is about 3 feet, the wing 12 or 14 inches, the tail 6 or 7. The plumage is glossy greenish-black, the feathers of the back bronzed gray with black edging; the gular sac yellow, white bordered; there is a small occipital crest, a white flank-patch, and numerous thready white plumes on the head and neck in the breeding season. This breeds in Labrador and Newfoundland, migrating south in winter to the Middle States. 2. A species of the widest distribution, both coastwise and in the interior, is the Double-Crested Cormorant (*P. dilophus*). It is nearly the size of the last, and of similar colors; but the gular sac is convex behind, and there are only 12 tail-feathers. The cormorant so abundant in the mangrove swamps of the Southern States is a variety of this species (*P. floridanus*); and the little-known *P. cincinnatus* of the Alaskan coast is supposed with reason to hold a like relation with the stock-form. 3. The Mexican Cormorant (*P. Mexicanus*), which extends some distance up the Mississippi valley, resembles the last, but is much smaller, with less convex gular sac. of an orange-color, white-edged; this is only about 2 feet long, and the general plumage is intensely lustrous with violet-purple. The remaining species all have the gular sac heart-shaped behind, as in *P. carbo*, but only 12 tail-feathers. 4. In Brandt's Cormorant (*P. penicillatus*) of the Pacific coast of the United States, the sac is dark blue, with a fawn-colored gorget behind it. The plumage is dark glossy green, changing to violet or steel blue on the head and neck, with long white filamentous feathers in a series down each side of the neck. This species has the scale-edged feathers of the back above noted, but in less degree. Nothing of the sort is seen in any of the following species. 5. In the little known Pallas' Cormorant (*P. perspicillatus*) of the N. Pacific coast, the shafts of the tail-feathers are said to be white, and straw-yellow filamentous feathers are described as springing from the sides of the neck. 6. The Red-faced Cormorant (*P. bicristatus*) swarms on some of the rocky islands in Bering's Sea. In this the feathers of the forehead do not reach the bill, being cut off by red naked warty skin; the base of the under mandible is blue; there is a medium black crest on the head, and another on the nape; a white flank-patch; the general plumage is richly iridescent, without distinction of the dorsal feathers. 7. The Violet-green Cormorant (*P. violaceus*) resembles the last, but lacks the peculiar markings about the face; it is much smaller, with a very

slender bill, and otherwise different. It inhabits the Pacific coast at large, breeding as far south at least as the Farallone Islands. Species of other countries, very different from any of the foregoing, must be passed over. (E. C.)

CORNELL, EZRA (1807–1874), the founder of Cornell University, was born at Westchester Landing, N. Y., Jan. 11, 1807. His father, who belonged to the Society of Friends, having removed to De Ruyter, established a pottery and also taught school. The son learned his father's trade, and early displayed great mechanical ability. In 1826 he removed to Homer, N. Y., where he made wool-carding machines, and in 1828 to Ithaca, where he was employed in the machine-shop of a cotton-mill, and afterward in a flour-mill. For fifteen years he was partly employed in mill-work and partly in agriculture. In 1843 he became connected with the practical application of the electric telegraph, then recently invented by Prof. S. F. B. Morse, and devised a machine for laying pipes underground to contain the wires. When this plan was abandoned, however, on account of imperfect insulation of the wires, Mr. Cornell still devoted his energies to the promotion of the new invention. He was made assistant superintendent, and substituted poles for pipes. The line was erected between Baltimore and Washington in time to report the nominations of James K. Polk and Henry Clay, the conventions of both parties, Democratic and Whig, being held in Baltimore in May, 1844. Yet even this was not sufficient to ensure the success of the telegraph, and leading newspapers as well as scientific men refused to countenance the undertaking. In 1845, Mr. Cornell superintended the construction of the line between Philadelphia and New York. A year later he erected that from New York to Albany, and gradually lines were extended in all directions. With firm faith in the new enterprise and a remarkable foresight of its utility he invested the profits of his early labors in telegraph stocks as well as in Western lands, and the subsequent rapid increase in value of these investments gave him a splendid fortune. In 1862 he was chosen president of the New York State Agricultural Society, and gave $50,000 for the endowment of a public library at Ithaca, where he resided. In 1863 he was elected to the assembly, and in 1864 to the State senate. Here his attention was attracted by the grant of land made to the several States by Congress in 1862 for the promotion of agricultural education. New York by the terms of the act was entitled to 990,000 acres, but two institutions to which this grant had been awarded proved unable to comply with the conditions attached. Mr. Cornell then conceived the idea of a university "where any person can find instruction in any study." A charter of incorporation was secured, and the university established at Ithaca in 1868 with an endowment of $500,000, which afterwards he greatly increased. Senator Andrew D. White, who had given much aid in carrying out the plan and securing the land-grant from the State, was made the first president. The advice of the most prominent educators was sought in regulating the courses of study, and eminent professors appointed in the different departments. Mr. Cornell undertook the management of the location and sale of the land-scrip with such success as to enhance its value greatly. Henceforth he devoted himself to watching over the interests of the university which bears his name. He died at Ithaca, N. Y., Dec. 9, 1874.

CORNELL COLLEGE, an institution of learning at Mount Vernon, Linn co., Iowa, was chartered in 1857, and graduated its first class in 1858. It had originally been a seminary, founded in 1852. The town and college are situated on an elevation rising from a beautiful valley, and affording fine views in every direction. The good natural drainage and pureness of the air afford conditions highly favorable to health. The college has four buildings, all of large size and substantially built. The chapel is a building of fine architectural appearance; its auditorium having seats for fifteen hundred persons, while the first story gives ample space for library, museum, and school assembly-room. The college is fairly supplied with scientific apparatus and has a library of 9000 volumes, additions to which are constantly made. There is a good chemical laboratory, and the students do much field-work in engineering.

Four courses of study are provided—classical, philosophical, scientific, and civil engineering; each requiring the same amount of preliminary work and being completed in four years. In connection with the college is a large preparatory department, a flourishing conservatory of music, and a successful art school. Instruction is also given in the theory and practice of teaching to those students who desire it. Classes for this purpose are formed in both the preparatory and the collegiate department. An army officer has been detailed for several years by the secretary of war to teach military drill, and the male students have been much benefited by the drill.

The college is under the patronage of the Methodist Episcopal Church, and is supported by the two conferences occupying the northern part of Iowa. It received its name from its early friend, W. W. Cornell, of New York city, and has been liberally aided by Rev. G. B. Bowman, D.D., Bishop L. L. Hamline, and other prominent Methodists. Bishop J. F. Hurst, LL.D., is president of the board of trustees. The alumni of the college number 429. They have a vigorous organization, and have sustained the chair of mathematics since 1873. The annual interest of their endowment fund is now sufficient to pay the salary of the professor. Rev. W. F. King, D.D., has been at the head of the institution for nearly thirty years. The number of students in the collegiate department in 1888 was 149, of whom 45 were ladies; the number in the other departments 272, making a total of 421.

CORNELL UNIVERSITY is an institution of learning at Ithaca, N. Y. The college buildings stand on a hill east of the village, and overlook the town, with the hills to the south of it and Cayuga Lake to the north. In 1862 the national government granted to the several States public lands, the proceeds of which on their sale should be devoted to the establishment and maintenance of schools of agriculture and the mechanic arts. Under this act the share of New York was 990,000 acres. Some of the States distributed their portions among their existing institutions, and the market was at once flooded with the land-scrip, which in consequence brought only about fifty cents an acre; but New York, after some unsuccessful experiments, was induced to accept the proposal of Ezra Cornell, a member of the State Senate, who offered to add $500,000 from his private fortune on condition that the whole fund should be appropriated to the founding and endowment of a single institution. Foremost among those who opposed the division of the fund and supported Mr. Cornell's proposal was Senator Andrew D. White, of Syracuse. The offer was accepted, and the site of the new institution was

fixed at Ithaca, the home of Mr. Cornell, who, besides fulfilling his pledge, made an additional gift of over 200 acres of land for an experimental farm, and devoted himself wholly to the organization of the enterprise. In recognition of these gifts and services the legislature named the embryo university after its chief benefactor.

The leading object of the university, as stated in the charter, is "to teach such branches of learning as are related to agriculture and the mechanic arts, including military tactics;" but other branches of science and knowledge are embraced in the plan of instruction. "Persons of every religious denomination, or of no religious denomination, are eligible to all offices and appointments." The board of trustees, moreover, must be neither sectarian nor irreligious; "at no time" should "a majority of the board be of one religious sect, or of no religious sect." "The governor and lieutenant-governor, the speaker of the house of assembly, the superintendent of public instruction, the president of the State Agricultural Society" are *ex officio* members of the board of trustees, and one student from each assembly district, selected annually from the public schools by competitive examination, is entitled to education in the university free of all charges for tuition. The board of trustees, when complete, consists of twenty-four members, three of whom are elected every year to serve for a term of five years. Of these two are chosen by the board itself, and one by the alumni.

Senator White resigned his professorship of history at the University of Michigan and in 1868 accepted the presidency of the new institution, which in October of that year opened its doors for the admission of students. The faculty consisted of twenty-five professors, nineteen of whom were resident and six non-resident. The former were mostly young men, but included Goldwin Smith, William Channing Russel, and Evan W. Evans. The system of non-resident professors was a device to secure to students lectures and instruction from men of ability in all parts of the country who could not become permanently attached to the university. This class was represented at the outset by Louis Agassiz, James Russell Lowell, George William Curtis, and Theodore W. Dwight. Besides these there were four assistant professors and three instructors. In the first year 388 students were received. Within the scope of the instruction were included courses in agriculture and the mechanic arts, and also general courses in science, philosophy, and the classics. Special prominence was given to studies in history and political science. Students were allowed much freedom in the choice of their studies, and were not subjected to a daily marking system. In order to aid self-supporting students as much work as possible upon the university farm and grounds, and in the workshops and buildings, was assigned to them.

The history of the university is that of rapid but healthful growth. Its development has continued strictly in the lines laid down at its beginning. During the earliest years the college grounds were graded and beautified, at an expense of over $50,000; and in 1870 Mr. John McGraw, of Ithaca, added to the two original buildings the noble central edifice. In its tower his daughter placed a chime of bells. Hiram Sibley, of Rochester, erected and endowed the Sibley College of Mechanic Arts; and William Kelley, of Rhinebeck, contributed an extensive collection of mathematical works. Prof. Goldwin Smith gave a large part of his private library; President White, his rich collection of works on architecture; Rev. Samuel J. May, of Syracuse, his books and pamphlets relating to the anti-slavery struggle in America; and Mr. Green Smith, of Geneva, his fine collection of American birds. These are but the more important of the numerous gifts to the new foundation during the first three years of its existence. In 1872 the university accepted the offer of the Hon. Henry W. Sage for the erection of a building as a residence for young women, on condition that they should henceforth be admitted to all the privileges of the institution on the same terms as young men. The Sage College for Women was at once built and endowed at an expense of $250,000; and to this gift Mr. Sage soon added another, the University Chapel, while one of his sons gave an organ, and another endowed the university pulpit. Until his death, in 1874, the university continued to owe much to the bounty of its founder. The internal growth of the university during these years kept pace with this outward prosperity. The number of professors, assistant professors, and instructors had increased to forty-three. Full courses in architecture and in English literature had been added to the curriculum, and the older courses had been much extended; the number of students exceeded 500, of whom 40 were women. At various times Pres. White was absent on account of public duties, and for two years was American Minister at the court of Berlin. In 1881 the advantageous sale of a large portion of the university's lands put the whole institution upon a better footing. The school of history and political science was at once reorganized and a four-year course marked out. Prof. Moses Coit Tyler was called to fill a chair of American history, and new lectureships in international law, political economy, and constitutional history were established. Large additions were made to the scientific and technical apparatus. A new laboratory for the departments of chemistry and physics, a drill-hall for the military department, and an astronomical observatory were erected. And just at the beginning of these preparations came the munificent gift of Mrs. Jenny McGraw Fiske, making the university library the richest in the land.

The following statement shows the condition of the university's funds in 1883:

Land scrip in comptroller's hands	$473,412.87
Current land contracts	2,482,684.61
Estimated value of unsold lands	1,500,000.00
Real estate (exclusive of western lands)	713,672.53
Equipment of departments	289,889.01
Mr. Cornell's endowment gift	628,596.61
The Sage College " "	125,000.00
" " Sermon " "	30,000.00
Mr. Sibley's " "	30,000.00
The Woodford Prize Fund	1,500.00
The Horace K. White Prize Fund	500.00
Mrs. Jenny McGraw Fiske's gift	1,500,000.00
Total	$7,721,255.52

After the death of Mrs. Fiske, her husband, Prof. Willard Fiske, resisted the gift of her residuary estate to the University, on the plea that it already held all the property that it could legally acquire. The courts sustained this view, and Prof. Fiske has gone abroad to enjoy his fortune.

The university faculty consists of forty-four resident and six non-resident professors, besides instructors and examiners, and is divided into fourteen or more special faculties corresponding to the several departments of study.

The courses in agriculture are intended to fit young

men to be enlightened farmers. Instruction is given in applied agriculture, agricultural chemistry, economic entomology, horticulture, and veterinary science, both by recitations and lectures. Practice in the chemical, botanical, entomological, and veterinary laboratories is required, and a certain amount of time is given to work in the barns and upon the farm. The department is well equipped, possessing, besides its experimental farm and stock, much illustrative material in the form of models, collections, and apparatus.

The whole ground of education in architecture, practical, scientific, historical, and æsthetic, is covered as completely as is practicable in a four-year course. The equipment of this department includes, among other things, the White architectural library and the most extensive collection of architectural photographs yet brought to America.

Save for the special attention given to agricultural and industrial chemistry, the instruction in chemistry and physics differs little from that at other American universities of the first rank. There are two professors, one assistant professor, and two instructors in chemistry, and a professor and an assistant professor for physics. The physical and chemical laboratory is most complete.

The department of civil engineering has been very successful. In addition to the regular four-year course a five-year course, giving more option in the choice of studies, has been arranged for special engineering students. Instruction is also given in mining engineering, and a school of mines, with full courses, is about to be established.

The school of history and political science was not fully established until 1881. The instruction in history includes courses of lectures on general history, ancient and modern, on English history, on American history, and on the philosophy of history, besides text-book and recitation work. Political and social science is treated under the heads of political economy, theoretical politics, systematic politics, international law, and American law and jurisprudence. *Seminarien* in American history and in political science have been established, and much of the best work of the course is done in these.

As regards languages, the field of instruction is wide. Greek is required only in the course in arts, but Latin belongs also to the courses in Literature, Philosophy, and History and Political Science. Though none of the Oriental languages are necessary for any baccalaureate degree conferred by the university, classes in Hebrew, in Arabic, and in Sanskrit are formed nearly every year; and modern Persian, Chinese, and other eastern tongues have been taught. German and French form an essential part of nearly all the general courses; but Italian, Spanish, and other modern languages are wholly optional. Gothic, old and middle high German, and the Scandinavian and Netherlandish languages are taught to advanced students. Anglo-Saxon is a required study in the course in English literature.

The instruction in mathematics, though thorough, has no peculiar features. The Sibley College of Mechanic Arts takes its name from the Hon. Hiram Sibley, of Rochester, to whose benevolence it owes its building and equipments, together with the endowment of its main professorship. The building includes, besides lecture-rooms, rooms for free-hand and mechanical drawing, and the machine-shop; and connected with it are a brass and iron foundry and a blacksmith-shop. Each student in mechanical engineering is required to devote two hours a day to work in the shop, which is fully equipped with all the ordinary hand and lathe tools used by machinists, as well as with many of the more complicated machines and attachments, with tools of accuracy for experimental work, and an exhaustive collection of mechanical models.

It being a special requirement of the charter that instruction in military science should be a feature of the institution, all male students, save foreigners, laboring students, and those physically unfitted, are required to provide themselves with the university uniform and to take part in military drill during the first and third terms of the first and second years. This instruction in tactics is under the charge of an officer detailed for the purpose by the United States government, who, in addition, delivers each year a course of lectures upon military subjects.

The department of natural history is divided into sub-departments of botany, geology, palæontology, and zoölogy. The instruction in each includes laboratory and field work, as well as lectures; and the illustrative collections are very full. Thus the Newcomb collection of shells (embracing more than 20,000 species) is the finest in America; and the Hartt collections of South American fossils and fishes are quite unique. Both the native flora and the local facilities for geological and palæontological research are exceptionally rich.

The department of philosophy and letters is remarkable for the great fullness in the course in English literature.

The university collections and apparatus, as a whole, constitute one of the largest college equipments in the United States, the apparatus for scientific and technical study being especially complete.

The library, which already ranks fourth among the college libraries of the country in point of size and value, containing above 108,000 volumes, has recently become the most richly endowed of American libraries, and is growing rapidly. Its collections of periodicals, literary, scientific, and technical, are especially full. In works relating to architecture, to the mathematical sciences, and to oriental philology, the library is also very rich.

The courses of study have been divided into general, special, and optional courses. The first class comprises: (1) the course in Arts, leading to the degree of Bachelor of Arts, corresponding to the regular classical course of American colleges; (2) the course in Literature, leading to the degree of Bachelor of Literature, which substitutes for the study of Greek a thorough training in English literature and the modern languages; (3) the course in Philosophy, or Latin scientific course, leading to the degree of Bachelor of Philosophy; (4) the course in Science and Letters, which leads to the same degree but aims at a somewhat more general culture than the last named. The special courses correspond in the main to the several departments of instruction, and are as follows: (1) Agriculture, two courses, a four-year course leading to a degree of Bachelor of Agriculture, and a three-year course not leading to a degree; (2) Architecture, leading to the degree of Bachelor of Architecture; (3) Chemistry and Physics, leading to the degree of Bachelor of Science; (4) Civil Engineering, two courses, a four-year course leading to the degree of Bachelor of Civil Engineering, and a five-year course leading to the degree of Civil Engineer; (5) History and

Political Science, leading to the degree of Bachelor of Philosophy; (6) Mathematics, leading to the degree of Bachelor of Science; (7) Mechanic Arts, leading to the degree of Bachelor of Mechanical Engineering; (8) Natural History, two courses, a four-year course leading to the degree of Bachelor of Science, and a two-year course (preparatory to the study of medicine) not leading to a degree. Optional courses may be marked out by students themselves, with the approval of the faculty, and do not lead to degrees. Post-graduate courses, leading to advanced degrees, are laid down in most of the departments; in these, as elsewhere, the field of election is very large.

The regular charge for tuition is $75 a year; but tuition is free to students in agriculture, to students holding scholarships from the State, and to resident graduates. No fellowships or scholarships have as yet been established save those provided by the State of New York at the outset. Under this provision 120 students each year, selected by competitive examination from the assembly districts of the State, are entitled to enter the university and pursue a four-year course of study free from all charge for tuition. A loan fund also exists.

The university buildings are at present ten in number, and form two main groups: (1) the quadrangle, or stone group, at the north, containing the lecture-rooms, laboratories, library, and museums; and (2) the brick group, at the south, comprising the University Chapel, the Sage College for Women, and the gymnasium. Another building, the Cascadilla Place, is at the entrance to the grounds; and the campus is bordered on the east and west by the residences of professors. Cascadilla Place, an imposing structure of gray stone, is now, by reason of its distance from the other buildings, used mainly as a place of residence for members of the faculty. The North and South Universities, built of stone quarried upon the grounds and unimpressive in appearance, are the oldest of the college buildings, and contain the greater part of the lecture-rooms, as well as the university offices and the halls of the literary societies. Between them is the McGraw building, also of native gray stone, and the largest of the group. The body of the building contains the library and museum, and the two wings the departments of geology and zoölogy. In its tower, which commands a view of the entire surface of Cayuga Lake, are the great bell of the university, the chimes, and the university clock. The physical and chemical laboratory is a handsome edifice of red Medina sandstone, at the north-west corner of the quadrangle. East of this, and at the extreme north of the campus, stands the Sibley College of Mechanic Arts, with its appendages, overlooking the deep ravine of Fall Creek, which bounds the university grounds. The departments of civil engineering and veterinary science occupy in common a large temporary building of wood, to the east of the McGraw. The most important building of the brick group is the Sage College, which occupies a commanding knoll at the south-east of the campus. It is a quadrangular edifice, the most spacious of the university buildings, and is mainly a home or dormitory for women students, accommodating about 100 pupils; but it also contains the commodious lecture-rooms, museums, laboratories, and green-houses of the department of botany. The University Chapel, situated midway between the Sage College and the South University, is a Gothic structure of brick with stone trimmings. It has two audience-rooms—nave and transept—the larger of which will seat 500 persons. The gymnasium stands at the south-west corner of the campus proper, overlooking Cascadilla ravine to the south. A new library edifice worthy of the splendid endowment of that department is soon to rise at the south-western angle of the stone quadrangle. An endowed college hospital, the gift of the late Mrs. Fiske, and an observatory are the most recent additions to the university buildings. Among these buildings ought to be included the residence of the president, on an eminence at the east of the campus, and also the mansion of the late Mrs. Fiske, adjoining the campus at the north-west. The former was erected at the private expense of President White, and is now occupied by President Charles Kendall Adams, who succeeded to the presidency in 1886; the latter is at present used by the university as a museum of art.

Women students stand in all respects upon the same footing as young men, save that they are exempted from military drill. Since their admission in 1873, over 100 have graduated; and the number actually in the university at any one time is between 50 and 60. A majority of these reside at the Sage College; though some make their homes in private families.

As a part of the public-school system of the State, the university cannot, if it would, place the religious instruction of the students in the hands of any sect. Religious services are, however, held regularly in the University Chapel; and during the fall and spring terms its pulpit is filled weekly by clergymen of the various denominations. These services are supplemented by the meetings of the University Christian Association, held in one of the university buildings. While students are not compelled to attend any of these religious exercises, every effort is made to attract them thither.

In the early years of the university a systematic effort was made to ascertain how far it is possible for a student to support himself by manual labor while carrying on a course of university study. The prices paid were the same as would have been paid to other laborers doing the same work. The result of this experiment was to show that a young man skilled in some handicraft—carpentry, masonry, type-setting, engraving, machine-construction—might in many cases partially, and in some cases wholly, maintain himself; but that young men who came relying entirely on unskilled labor—and by far the greater part belonged to this class—very seldom possessed the combination of physical and mental strength required for success. The wages of unskilled labor were too low and the work too exhausting. So long, however, as there was work to be done in the grading and improvement of the university grounds, many aided themselves materially by this means. The university still gives its janitorships to students, and there is some demand for labor upon the university farm. The university press affords a constant means of self-help to students skilled in the art of printing; and experience has shown that few students are more successful than those who thus work their way through. But the university does not guarantee employment to any student.

CORNING, one of the county-seats of Steuben co., N. Y., is on the Chemung River, 132 miles S. E. of Buffalo and 17 miles W. of Elmira, on the New York, Lake Erie, and Western Railroad. The Corning and Antrim Railroad connects it with the coal-fields of Tioga co., Pa., and it is a terminus of the Syracuse, Geneva, and Corning Railroad. It has a court-house, opera-house, 4 hotels, 2 weekly newspapers, 5 schools

a public library, 5 churches, an orphan asylum, and water-works. Its industrial works comprise glass-works, engine-works, railroad-shops, machine-shops, 2 planing-mills, sash- and blind-factory, and a flour-mill. It is at the head of the Chemung canal and was named from Hon. Erastus Corning. It was incorporated in 1848 and made a half-shire in 1854. Population, about 8520.

CORONER. An officer of the government in England and countries of English origin, so called from *corona*, the crown, because the *coronator* or "crowner" was formerly a deputy of the king charged with important duties. But from the reign of Elizabeth downward the office has fallen into incompetent hands, and has occasioned much ridicule and some abuses. Legally the coroner may act for the sheriff, or may serve a writ upon the sheriff, but his chief duty has been, for many years, to inquire into the circumstances attending violent deaths. In Scotland there is no coroner, but a "procurator-fiscal," whose duties are those of the French *procureur* or public prosecutor, attends to the duties of a coroner, as the *procureur* does in France, and as a corresponding official does in Austria. In Prussia the judges of the primary courts, assisted by surgeons and other officers of their courts, investigate the death of persons under suspicious circumstances; and this practice prevails in Connecticut, and perhaps a few other American States. But generally the English usage, which has prevailed since Alfred's reign, has been followed in the United States, and coroners, aided by special juries, hold inquests and return verdicts. In Massachusetts, before 1877, these inquests became so costly and useless, and were occasionally so much abused by malicious or mercenary coroners, that a summary law was passed in that year abolishing the office of coroner. Instead of it, the office of "medical examiner" was created, the term to be seven years (as of coroners), but the number limited to seventy,—whereas formerly there were nearly fifty coroners in Suffolk county alone. These examiners are to be all medical men, and upon due notification are to view and report upon dead bodies, holding autopsies and special inquiries when needful. The new system was adopted chiefly upon the representations of Mr. T. H. Tyndale, a Boston lawyer, whose investigations, following those of Mr. Herschel, an English lawyer, in 1876, convinced the Massachusetts legislature that a change was expedient. The new system has worked so well that other States are preparing to adopt it. It is less expensive to the public than the coroner system, gives less annoyance to individuals, and promotes better the ends of public justice; since, when necessary, the public prosecutor and the primary courts take part in the proceedings, as in France and Germany. In England the office of coroner fell into much contempt, and was the occasion of many abuses, some of which still prevail, although the office is a more dignified and important one there than it was one hundred years ago. Mr. Farrer Herschel's attack upon the English system of coroners and juries has attracted attention; but the traditional office still exists there, and the old system survives, although better guarded than in most of the United States.

See Vol. VI. p. 381 Am. ed. (p. 430 Edin. ed.).

See *Proceedings of the British Social Science Association for* 1876, and of the *American Social Science Association for* 1877; also the publications of the Massachusetts Medico-Legal Society, which receives reports from all medical examiners. (F. B. S.)

CORPORATION. The old Aryan household, the antecedent and necessary predecessor of the modern family founded on kinship, has been justly considered by Coulanges and others to be the progenitor of the modern corporation. "The household was thus an association formed upon religious belief and contemplating religious objects. But it was something more: it was a permanent association. It was not intended to pass away and be re-formed like the generations of men. It was constructed, and was meant to endure forever. It was, in our technical language, a corporation. It had perpetual succession. It included in its members both the living and the dead." (Hearn, *Aryan Household*, p. 66.) We view institutions from the family stand-point; but the modern family, however it was organized and established at first, was unknown when the early races began those forms of living, which are now developing into what we call civilization. This enlarged power of personality, this principle of succession created first the king sole in his corporate functions, then the church with various guilds and charitable organizations, the free city, and the modern municipality, and finally the commercial, the moneyed, the industrial corporation. The Roman *collegium* was the main vehicle which brought over these varied institutions. The element of sovereignty, carefully suppressed by the Romans, developed afterward into the municipality, though this point is a matter of dispute. The civil government proper, whether imperial, feudal, or kingly, was constantly restraining these associations, which tended to assume power and to encroach upon the claims of the sovereign. The ordered limits of the modern state give free play to many social tendencies, which mediæval governments regarded as seditious. The political functions of the corporation are now well classified, the religious have become consolidated in the various forms of the Christian church; while the purely social, the charitable and friendly, as distinguished from the economic and industrial functions, have found expression in organizations of their own.

See Vol. VI. p. 382 Am. ed. (p. 432 Edin. ed.).

We would call attention to it as a social agent, an instrument for working out those desires which are common, and which can be put forth by the individual only in combined action with his fellows. The early experience of America, in its struggles with a powerful kingdom, its first feeble organization under the Confederation, its largeness of territory and sparseness of population had developed two kinds of capacity in its people. A self-reliant race of freemen grew up, who soon found that they must trust in each other and rely upon common action, in the same measure that they trusted in themselves and followed the bent of their own desires. The same spirit which founded the American Union, and welded it finally into a free but imperial government, impelled the citizens in common life to combine for every kind of enterprise. In no country have law and the common business of life so fused and interpenetrated as in this republic. The lawyer is the priest of the commonwealth. The American lawyers found in the old Roman *collegium*, the then inchoate English corporation, a tool half ready to their hand. They forged it anew, and used it constantly in the growing life of the new country.

The power of creating corporations was denied to the general government by the party which would limit its prerogative. But Hamilton argued that sovereignty resided in the government of the United States, and that the power to create these civilizing

combinations was a part of the sovereign authority. The Supreme Court sustained him, but the State legislatures have been the chief creators of our corporations. The terms *public* and *private* hardly suffice to define corporations, but they have been much used in this country. They distinguished a *public* from a *political* corporation, where the former had certain social attributes which were united with partial political attributes. If the stock in the Bank of the United States had belonged *exclusively* to the government, then it would have been a *public* institution in one sense; but inasmuch as there were other stockholders it became a *private* corporation, and the State took the place and the rights of an individual stockholder, in that act divesting itself of i.. sovereignty.

"The main distinction between public and private corporations is, that over the former the legislature, as the trustee or guardian of the public interests, has the exclusive and unrestrained control; and acting as such, as it may create, so it may modify or destroy, as public exigency requires or recommends. . . . Private corporations on the other hand are created by an act of the legislature, which, in connection with its acceptance, is regarded as a *compact*, and one which, so long as the body corporate faithfully observes, the legislature is constitutionally restrained from impairing, by annexing new terms and conditions, onerous in their operation, or inconsistent with a reasonable construction of the compact." (*Angell & Ames on Corporations*, § 31, chap. 1.)

Overseers of the poor, supervisors of a county and of a town, loan officers of a county, school districts, etc., many semi-public bodies, acting in the public interest, are *quasi* corporations.

"They were defined by Chief-Justice Parker to be not bodies politic and corporate, with the general powers of corporations; and the reasoning advanced to show their defect of power is conclusive. The same may be said of towns and other municipal societies; which, although recognized by various statutes and immemorial usage, as persons or aggregate corporations, with precise duties which may be enforced, and privileges which may be maintained, by suits at law, yet are deficient in many of the powers incident to the general character of corporations. They may be considered, under our institutions, as *quasi* corporations with limited powers, co-extensive with the duties imposed upon them by statute or usage; but restrained from a general use of the authority which belongs to these metaphysical persons by the common law."

The "sole" corporation survives in America in a few instances. Where the usages of the Church of England had been adopted in the colonies and the common law had begun its work tacitly, "the minister of the parish was seised of the freehold, as *persona ecclesiæ* in the same manner as in England; and the right of his successors to the freehold being thus established, was not destroyed by the abolition of the regal government nor can it be divested even by an act of the State legislature." These historic and prescriptive rights were maintained by the great jurists Story and Shaw.

We must consider the experience of our forefathers, how they hated hereditary aristocracy and all dominating privilege, in order that we may appreciate this devotion to the best spirit of law and order. The Episcopal church, naturally conservative and loyal, had not been a popular institution in the Revolution. And the revolutionary patriots had imbibed a fierce feeling against all forms of society which could limit or restrain the aspirations, the development, the freedom of the individual man. Observers looked for the downfall of this new experiment in government, from these very causes. The fathers endured patiently the mystic obligations of the legal corporation and never laid their legislative hand on any of its time-honored privileges. This common characteristic of the American people has not been recognized sufficiently. They can serve as well as command, give as well as take, share as well as seize.

"It is remarkable," said Chancellor Bland, of Maryland, "that there is no instance of the creation of any body politic of this description (private) under the provincial government; but since the establishment of the republic, they have increased and multiplied to a very large and still rapidly growing family."

Chancellor Kent said their growth was "astonishing," and New York attempted to check their formation in 1821. But the principle of growth sprung from the necessities of the people, and the legislature could not prevent the increase. At the same period it was said "their facility of action has become a matter of public importance," and the courts modified their practice to enable them to work more freely.

The free employment of this means of association and combination has affected every social issue in American history. In finance and in travel, communication and transportation, it found its greatest opportunity and largest development. Capital was the chief necessity and inter-communication was hardly less necessary in the new and widely extended community.

Immediately after the Revolution banks of issue and deposit began to be incorporated in the larger towns. In the opening of this century they had extended into villages and even hamlets. This ill-regulated currency, poor as it was in comparison with the secured paper money of these days, was nevertheless a boon to a struggling community. One must see the influence of a bank of deposit and discount in poor and half isolated communities in order to comprehend the blessings of better mercantile system and better regulated credit which it affords. The unsafe and miserly hoarding of barbarism becomes the orderly and thrifty venture of civilization. Ship-owners associated themselves, not with all the legal, but with the efficient, powers of the corporation, and developed the finest race of ship-masters possible in the times when commerce was a matter of individual venture, rather than of mechanical arrangement. The co-operative system of their whaling-ships made that enterprising fleet the wonder of the world.

Textile manufactures were well under way when the century had completed its first quarter, and the larger enterprises were forwarded by the same means. Canals were dug generally, though not always, with the aid of the State. Then railroads, the most powerful engines of our present civilizations, were projected timidly, on short and hesitating lines. We must not infer that the simple American citizens and legislators did not know what they were doing when they built up these incorporated beings, these creatures instinct with a fecundating life, new to the world of those days. When the early railroads sought for their charters the opposing lawyers startled the assembled farmers by the picture they drew of this suzerain with more than feudal powers, which was to come among them and run his great iron feelers through their farms and barnyards. *In mortmain*, with the dead hand, reaching out from a ghoul-like past, would this creature seize upon their land and hold it to tyrannize over their chil-

dren. The grantors provided that the land should revert to the owners when the corporate incidents of the railroad should have ceased. But the most ludicrous theory of burgher independence, in the light of our modern experience, was the provision made for any individual to run his own vehicles over these semi-public highways, at his own expense, on paying fair tolls. To run one's own locomotive and train over one of Vanderbilt's or Gould's lines in these days would be a ghastly kind of independence or comfort.

They built quite as well as they knew. Judge Marshall in the famous Dartmouth College case, which marked an era in the corporation law of this country, says: "the great object of an incorporation is to bestow the character and properties of individuality on a collective and changing body of men." But this process is subject to limitations growing out of the experience of Rome and the more concrete common law of England. In the Ashton railway-carriage case, legal opinion was divided. One party of judges held that "the common law incidents of a corporation adhere, unless expressly removed by the legislature;" and the other held that "the contract could not have been ratified by the unanimous assent of the whole corporation." An individual can make a contract at will if he violate no law. But a corporation, while it has received powers from the State, also surrenders to its progenitor some powers which the individual naturally holds (Brice: *Ultra Vires*, Green's Am. ed., pp. 31, 32). Chief-Baron Manwood was right when he demonstrated that corporations have no souls. As he laid down, none can create souls but God; corporations are created by the king; therefore a corporation can have no soul. The instinct of the jurist was wiser than his logic. In our view, the ruler can formulate and register; he cannot create. The creative powers of the sovereign have gone with the old dogma of divine right into the night of the past. The powers which civilization has engendered are reduced to order and legitimated by the sovereign power of the State; their vitality and essential life come from the power which is anterior to and above the head of the State.

All corporations must pass through this gate which divides them from persons, though the way leading to it is blind and perplexing. The doctrine of *ultra vires*—the abuse of power by going beyond its limits—is modern and has grown under the hands of the jurists. They saw with true wisdom that the spirit which controls a person could not be present in a body which acts through agents, and that a perpetual succession could not continue to accumulate all the legal and social rights of persons—beings whose powers cease and are renewed with every generation. The result of this evolution cannot be foreseen, but its operation is certain. Managers of corporations and their attorneys constantly assert that they can do as they please, having the control of their own property. But it is clear that the one thing these favored creatures lack under the law is the power of self-willing which goes with individual freedom, and goes with that only. Sooner or later the orderly development of law will bring these large-limbed creatures of civilization into close harmony with the larger and common interests of society.

With the latter half of the century began the great consolidating movement in railway corporations. The local institution, created for the wants of one neighborhood, though that locality might be one of the great States, proved too narrow for the continental wants and aspirations of the American people. The Pacific lines, linking oceans together, gave a further impulse to this natural movement. By the union of charters, and far-reaching contracts and leases, monster lines were projected and operated under one management. The sagacity of Cornelius Vanderbilt, who began the business of transportation in a small ferry-boat and ended in the largest railway business of the world in his day, fully comprehended the need of the time. He moved freight at rates which would have been impossible under the old system. The great Pennsylvania and Baltimore lines were quick to rival and even surpass him. The transportation of freight, costing 2.153 cents per ton per mile in the United States of 1866, was reduced to .866 cent in 1880, a reduction of 60 per cent.

There are those who treat laborers as a peculiar class, outside our whole society, with passions alien to it, and rights opposed to it. The members of society who do not labor, and the holders of capital especially, are presumed to have interests which certainly oppose, and often oppress, the laborer. The corporation is held by these sciolists to be an essential antagonist and oppressor of the laboring class. Let us consider what has been the result to the laborer of this development of railway freight transportation, that most striking industrial achievement of the corporation. A man standing on the Atlantic seaboard, by two days' labor with his shovel, can bring to his own door his year's subsistence, grown half a continent away. In this social movement capital and the organizing skill which conducts it become the servant of the laborer. We can hardly perceive, or even imagine, any better mode of serving a simple son of toil. He can put forth his effort on the ground, where it is most needed, or best paid; he can bring his food to that point from the place of its cheapest production for a trifling sum. The peculiar hardship of the laborer, under all circumstances, doubtless is a certain fixedness and immovability as compared with capital, which in its quick form is ever fluid and portable. In the above process, by these great consolidated movements, he can put himself where capital moves with the greatest energy, and at the same time he can bring to himself, at the lowest possible cost, the products of the earth—commodities, capital—which he must consume to maintain his own and his family's life.

The corporate method forms an excellent reservoir for capital, and the world has discovered as yet no means by which its benefits can be so widely distributed.

The savings institutions are the richest corporations in the United States after the railways; their deposits are in small sums, widely scattered, and are largely the property of artisans and laborers. The stock of national and State banks is shared among numerous holders. Wherever we find the most intelligence and the best administration of affairs, there is the most corporate life and activity.

This great agent of modern society, this sprite larger and mightier than all the goblins fancy ever conjured under the magician's wand, has developed not all its powers as yet. It is now on trial at the bar of public opinion, and one party aims to subject it to the will of the majority working through the State by ordinary legislation and administration. Others believe that the present evils of transition would be made worse by thus tampering with an institution which was cleared from the political machine by long and patient social

development. Political administration is of necessity clumsy, slow, and cumbersome. The checks and balances of the best State executive must hamper the social energies which civilization is evolving with ever-increasing force and variety. The corporation, beginning in the religious instinct, has been fostered by the common law. It is the social side of combined power, as distinguished from the political side—a branch shooting from the main trunk of the State, homogeneous with the parent stock, but producing different results. It gives to the commonalty some essential attributes of an aristocracy. For any one can buy a share in an industrial corporation, and thus take part in its advantages of succession, its consolidated social force. Or if the commonalty do not take part directly, they share indirectly through the service which the corporation must render to the whole of society by its close interpretation of social wants.

In the higher politics which govern the people ultimately these essential divisions and historical variations must be recognized. We may inspect and partially regulate corporations, through the political administration of the State, which charters them. The definite control of these mystic persons must be judicial, and must come through the *ultra vires*, the due process of the courts, which always moves in harmony with social development. To confound and confuse these mighty social issues would carry the American civilization—the most powerful the world has known—into a sea of unknown troubles. (W. B. W.)

II. CORPORATION in Law.—An aggregate corporation is an ideal body created by law, composed of individuals united under a common name, the members of which succeed each other; so that the body continues the same irrespective of the changes in its membership. (2 *Kent's Com.*, 215.) A corporation is vested by the policy of the law with a capacity of acting in several respects as a natural person, as to taking and granting property, contracting obligations, suing and being sued and of enjoying privileges and immunities in common, and a variety of political rights more or less extensive according to the design of its institution, either at the time of its creation or at any subsequent period of its existence. (*Kyd on Corp.*, vol. i., p. 13.)

Corporations may be either—1, *Public;* or, 2, *Private.* The most usual instance of the former is a municipal corporation created for governmental purposes, or any corporation entirely under the management of the commonwealth or of the United States government. *Nations* or *States*, as bodies politic, become moral persons susceptible of obligations and laws; and in this broad sense of the word the United States may be termed a corporation, and so may each of the States.

Private corporations are such as do not fulfil any functions of public government, and are not wholly within the immediate control of the government. The word *private* is not used here in its popular acceptation, for in that sense nearly every corporation is public, inasmuch as nearly all are created for public benefit.

Private corporations, again, are either *ecclesiastical* or *lay.* Ecclesiastical or religious corporations, as they are usually called in the United States, are created to enable religious societies of various denominations to manage with greater facility their temporal concerns. Lay corporations are those private corporations which are not under the immediate control of some religious society.

Corporations, considered with respect to the individuals which compose them, are either *sole* or *aggregate.* A sole corporation, as its name implies, consists of but one person. Such are very rare in the United States, except in those States where the religious establishment of the Church of England was adopted while they were still colonies, and where, according to the old common-law rule, the minister of the parish is seised of the freehold as "*persona ecclesiæ.*" In such case, the right of his successors, thus established, is held not to have been destroyed by the abolition of the regal government at the Revolution; nor can it be divested even by an act of the legislature. (9 *Cranch*, 328.) The capacity of a sole corporation to hold property in succession is confined to real estate; personal property cannot be so held. (9 *Cranch*, 43.) All corporations which are composed of more than one member are aggregate corporations. (E. F. S.)

CORPUS CHRISTI, the county-seat of Nueces co., Texas, is on the west shore of Corpus Christi Bay, 7 miles S. E. of the mouth of the Nueces River, and 178 miles south of Austin. It has communication with Mexico by the Texas-Mexican Railroad, and, having an excellent harbor, carries on extensive trade both by land and sea. It has 2 banks, 2 weekly newspapers, 7 churches, a convent, and several good schools. The land rises abruptly from the business part of the town to a height of 80 feet, and then extends into the prairie. The American army, under Gen. Z. Taylor, encamped here for some months in 1345, previous to the Mexican War. Population, 4378.

CORRY, a city of Erie co., Pennsylvania, is at the intersection of the Philadelphia and Erie Railroad with the New York, Pennsylvania, and Ohio Railroad, and the Buffalo, New York, and Philadelphia Railroad, 37 miles S. E. of Erie and 5 miles S. of the New York State line. It has 2 national banks, 2 opera-houses, 14 hotels, 2 weekly newspapers, 12 churches, a high school and 5 other schools, a park, gas-works, fire department, a board of trade, and telephone exchange. It has 26 manufacturing establishments, producing steam-engines, boilers, oil-well tools, pails and tubs, furniture, shingles, brooms, cigar-boxes, and leather. In 1861 it was simply a railroad station, but it grew into a town when petroleum was discovered in the neighborhood. In 1866 it was chartered as a city. Population, 5671.

CORSICANA, the county-seat of Navarro co., Texas, is at the intersection of the Houston and Texas Central Railroad with the Texas and St. Louis Railroad, 16 miles west of Trinity River and 180 miles N. N. E. of Austin. It has a fine court-house, 2 hotels, a bank, 3 weekly newspapers, 9 churches, and good schools. It has 2 machine-shops, 2 planing-mills, a flour-mill, and a cotton-compress. It was settled in 1848. Population, 8278.

CORTLAND, the county-seat of Cortland co., N. Y., is on the Tioghnioga River, and at the junction of the Syracuse, Binghamton, and New York Railroad with the Utica, Ithaca, and Elmira Railroad, and a branch of the New York and Oswego Midland Railroad, 36 miles south of Syracuse, and 125 miles directly west of Albany. It has 3 banks (1 national), 3 weekly newspapers, 6 churches, a State Normal School, an academy, and other schools. It has 5 wagon-works, manufactories of mowing-machines, wire, folding-chairs, and other industries. Population, 8561.

CORUNDUM. In the United States corundum is most abundantly found in close connection with the great belt of rocks, consisting, in their unaltered condition, of granular chrysolites, but generally changed into serpentines, talc- and chlorite-slates which stretch with more or less interruption from Massachusetts into Alabama. In many of the localities it occurs in sufficient quantity for extensive mining operations, as in Chester, Mass., Chester co., Pa., in Macon, Clay, Jackson, Madison, and Haywood counties, N. C., in Laurens co., S. C., Towns co., Ga., Tallapoosa and Coosa counties, Ala.

See Vol. XVI. p. 401 Am. ed. (p. 385 Edin. ed.).

A careful investigation of these occurrences has revealed the very interesting fact that many of the rocks in which corundum is found are the results of its alteration, and that it is only a remnant of large bodies which must have existed originally. By simply uniting with water, corundum $Al_2 O_3$ is changed into diaspore $H_2 Al_2 O_4$, or beauxite $H_4 Al_2 O_5$; by taking up iron- and magnesium-oxides, it is converted into a variety of spinel (Fe Mg) $Al_2 O_4$; its combination with silicic oxide gives rise to the two forms of $Al_2 Si O_5$, fibrolite and cyanite; if, besides, some alkalies, alkaline earths, and water enter into combination, minerals of a more complicated composition result, such as zoisite, several kinds of feldspar, as anorthite, andesite, oligoclase, and albite, or various micas, as muscovite, paragonite, and margarite, but also several chloritic minerals, viz.: prochlorite, kerrite, maconite, culsageeite, willcoxite, and others. All these changes have been observed, and many of the large belts of mica- and chlorite-schists, paragonite and pyrophyllite slates bear evidence that they once were corundum, altered into their present condition, as Prof. J. D. Dana expresses it, by *pseudomorphism on a broad scale.* (F. A. G.)

CORVIDÆ (Lat. *corvus*, a crow), a family of oscine passerine birds, with scutellate laminiplantar tarsi, 10 primaries, more or less cultrate bill, and usually dense nasal plumules concealing the nostrils; related to the starlings and birds-of-paradise, and comprising the ravens, crows, rooks, daws, choughs, pies, jays, etc. It is a large cosmopolitan family comprising some 175 species and 25 or 30 genera, but one not easy to define with precision, owing to the diversity of the forms which the term is allowed to cover. The most aberrant members are probably the piping crows of Australia (*Gymnorhinæ*). The choughs are another special group (*Fregilinæ*). Most of the *Corvidæ*, however, fall in the two sub-families of the crows proper (*Corvinæ*) and jays (*Garrulinæ*). See CROW. (E. C.)

CORWIN, THOMAS (1794–1865), an American statesman, was born in Bourbon co., Ky., July 29, 1794. His father had removed from New Jersey to Kentucky, and in 1798 crossed the Ohio River into the North-western Territory. Settling near what is now Lebanon, Warren co., Ohio, he was afterwards elected to the State legislature. Thomas improved his scanty opportunities for education, and having entered the county clerk's office in 1814, he soon after began to study law. He was admitted to the bar in 1818, and his ability, readiness, and eloquence soon gave him prominence as an advocate. In 1822 he was elected to the State legislature, where he served for seven successive years. In 1830 he was sent to Congress, where he was an ardent supporter of Henry Clay, and was prominent in the councils of the Whig party. In 1840, when Gen. W. H. Harrison was its presidential candidate, Corwin received the nomination for governor of Ohio, and during that exciting campaign spoke in nearly every county of the State. His fame as a political orator was fully established, and he was elected governor for two years. In 1845 he was chosen United States Senator, and during his term opposed the annexation of Texas and the war with Mexico. His speech on the latter is one of his ablest efforts. On the death of Pres. Taylor in 1850, Vice-Pres. Fillmore succeeded, and in reorganizing his Cabinet appointed Mr. Corwin Secretary of the Treasury. At the close of his term he resumed the practice of his profession in Ohio, but in 1858 he was again elected to Congress as a Republican. When civil war was imminent he exerted himself to effect a compromise. Pres. Lincoln in 1861 appointed him minister to Mexico, where he remained until the arrival of Maximilian in May, 1864. He then returned to Washington, where he was engaged in professional duties until his death, Dec. 18, 1865.

COSHOCTON, the county-seat of Coshocton co., Ohio, is on the Muskingum River, at the confluence of its branches, the Walhouding and the Tuscarawas Rivers, and on the Pittsburg, Cincinnati, and St. Louis Railroad, 26 miles N. of Zanesville, and 69 miles E.N.E. of Columbus. It has 2 banks (1 national), 6 churches, 2 schools, 4 weekly newspapers (1 German). It has 2 flour-mills, a paper-mill, and a manufactory of steel springs and axles. It was laid out in 1802 under the name of Tuscarawa, which was changed in 1811, and was incorporated in 1833. Population, 3725.

COSTA, SIR MICHAEL (1810–1884), musical composer, born at Naples, Feb. 4, 1810. While a student at the Royal Academy of Music in that city he performed the following works of his own composition: In 1825, *L'Immagine* (cantata); in 1826 and 1827, the operas *Il Delitto Punito* and *Il Sospetto Funesto*, a mass, three symphonies, and *La Passione*. In 1828, Costa wrote the semi-seria opera *Il Carcere d'Ildegonda* for the Teatro Nuovo, and in the following year *Malvina* for Barbaja, the manager of San Carlo. On being sent to Birmingham to direct the performance of the chora. work *Super Flumina Babilonis*, which was composed by his teacher, Zingarelli, Costa received professional engagements that induced him to remain in England. In 1830 the ballet *Kenilworth* was written, and in 1832 another ballet, *Une Heure à Naples*. The following year *Sir Huon* (also a ballet) and the celebrated quartette *Ecco quel Fiero Istante*, which, having been sung repeatedly in the concert-room for half a century, may now be heard set to sacred words in churches in America. In 1837, Costa's opera *Malek Adhel*, which did not meet with great success in Paris, was received with more favor in London. His only other opera, *Don Carlos*, was produced in 1844. In 1855 he wrote the oratorio *Eli*, and in 1864 his last oratorio, *Naaman*, both for the Birmingham festivals. In 1869 he received the honor of knighthood from Queen Victoria, having previously been decorated by several European sovereigns.

The oratorios *Eli* and *Naaman* are Costa's most ambitious works. They are not, however, in the highest style of choral writing, but show a want of ability to combine many melodies simultaneously, and even the power to create musical ideas capable or worthy of being developed in choral fugues. The Italians have ceased to exercise themselves in such forms of writing, and hence the ancient ecclesiastical music of their country is superior to that of the present day. Costa seems to

have tried to atone for this want of skill in the invention and development of noble musical motives by making his work dramatic in form, depending upon incidents, violent contrasts, plot, startling situations, and an imagined action, rather than upon musical effects, as Handel did; as for instance, in the *Messiah*. From this point of view also it will be seen that the latter work leads to a contemplation and meditation of the moral outcome of the whole subject-matter, while the former works lead more to a consideration of the circumstances, and may eventually become tedious as twice-told tales.

In 1849, Costa became conductor of the Birmingham festivals; in 1857, conductor of the great triennial Handel festivals at the Crystal Palace, Sydenham; while at the opera-house and the concerts of the Sacred Harmonic Society in London his powers as an organizer and director have gained for him universal fame, which will endure when his compositions lie buried in silence. He died April 29, 1884. (S. A. P.)

COSTA RICA (REPUBLICA DE COSTA RICA), the most southern state of Central America, comprises an area of 21,495 square miles. The constitution of 1871, which had been in effect only nominally at any time, was entirely suspended in 1878 by Gen. Tomás Guardia, who had obtained the chief power in September, 1877. In 1880 he frustrated an attempt made to restore constitutional government. Guardia died July 6, 1882, and Gen. Prospero Fernandez was elected president, Aug. 10, 1882. The arbitrary rule of Gen. Guardia seems to have repressed the revolutionary tendency. He preserved peace with the neighboring states, though the still unsettled boundary-disputes with Nicaragua on the north and Colombia on the south seemed at times to threaten war. His administration, however, was extravagant in expenses, and plunged the country deeply in debt. This debt has since been considerably reduced. The president (for four years from May 8, 1890,) is José J. Rodriguez. On Dec. 30, 1888, an earthquake caused serious destruction, injuring San José, the capital city, to the extent of $2,500,000.

See Vol. vi. p. 397 Am. ed. (p. 449 Edin. ed.).

Finances.—The revenue for the fiscal year 1889–90 was $3,062,630, and the expenditure for the same period $2,988,425. In 1888 the foreign debt then existing was consolidated into a new obligation of $10,000,000 at 5 per cent., the customs revenue being pledged for the interest.

The leading productions of Costa Rica are valuable cabinet and dye-woods, tobacco, sugar, bananas, cacao, vanilla, etc., which, with hides, tortoise shell, and mother of pearl, are largely exported. But the leading staple of export is coffee. The total exports of 1889–90 were valued at $4,975,255, more than half of it being coffee. The imports for the same period were $4,450,575; chiefly manufactured goods from Great Britain, and produce from the United States. The population in 1885 was 213,785. The principal railroad is a line from Limon, on the coast, to San José, 118 miles long. There are 52 miles besides, and about 400 miles of telegraph. The chief ports are Punta, Arenas and Limon. The other leading cities are San José (which has a population of 13,484), Cartago, Alajuela, and Heredia.

COTTA, BERNHARD (1808–1879), a German geologist, was born at Kleinen-Zillbach, in Thuringia, Oct. 24, 1808. His father, who was director of the Forest Academy of Tharandt, near Dresden, taught him mineralogy, and the elements of geology. From 1827 to 1831 he studied at the School of Mines of Freiberg, and in 1832 passed to Heidelberg, where he received the degree of Ph. D. In 1841 he became secretary of the Academy of Tharandt, and in 1842 was appointed Professor in the Freiberg School of Mines. He died in that city on Sept. 14, 1879. His first work, *The Dendroliths* (1832), marked him as a diligent investigator. He then commenced researches in geognosy, in conjunction with Naumann, and published a geognostic map of Saxony. This valuable work occupied ten years (1832–42), being accompanied by several volumes of commentaries and explanations. Cotta also prepared a geognostic chart of Thuringia (1843–48). Besides these maps, his more important works are *Geognostische Wanderungen* (4 vols., 1836–38); *Anleitung zum Studium der Geognosie und Geologie* (1839); *Briefe über Alex. von Humboldt's Kosmos, ein Commentar* (1848–51); *Geologische Briefe aus den Alpen* (1850), published after two journeys of exploration in the Alps and in Italy, 1843 and 1844; *Ueber den innern Bau der Gebirge* (1851), which contains his theory of the history of creation; *Geologische Briefe*, a popular work; *Lehre von den Erzlagerstaetten* (1855); *Deutschlands Boden* (2d ed., 1858); *Geologie der Gegenwart* (3d ed., 1871); and a work on phrenology, *Gedanken über Phrenologie* (1845).

COTTON, JOHN (1585–1652), one of the first ministers of Boston, was born at Derby, England, Dec. 4, 1585. He was educated at Trinity College, Cambridge, and was afterwards fellow of Emmanuel College, lecturer, and tutor. In 1612 he became vicar of St. Botolph's Church, Boston, Lincolnshire, where he remained twenty years, gaining a wide reputation as a Puritan preacher and controversialist. Being cited to appear before Archbishop Laud's court in 1632, he sought safety in flight, and finally came to Boston, Sept. 4, 1633. Within two months he was ordained teacher of the church there, and soon exerted a wonderful influence, as is shown in part by his introducing the practice of observing the Sabbath from evening to evening which long prevailed in New England. In 1630 he was appointed by the general court to prepare a code of laws for the colony. This task he performed, taking the laws from the Old Testament, but the *Body of Liberties* drawn up by Nathaniel Ward was preferred and adopted. Cotton's *Abstract of the Laws of New England*, however, was published in England in 1641 as if actually in use. He was a strong upholder of theocratic government, and in his controversies with Roger Williams maintained the right of the civil government to interfere in matters of religion and punish heretics. His treatise on *The Keys of the Kingdom of Heaven, and Power thereof*, was answered by Williams in the *Bloody Tenet of Persecution for the Cause of Conscience*, 1644, and defended by Cotton in *The Bloody Tenet Washed and made White in the Blood of the Lamb*, 1647; but Williams rejoined in *The Bloody Tenet made more Bloody by Mr. Cotton's Endeavors to Wash it White in the Blood of the Lamb*, 1652. Cotton also published a catechism called *Milk for Babes*, a treatise on civil government called *Meat for Strong Men*, and *Singing of Psalms a Gospel Ordinance*. His sincere piety, pastoral fidelity, and long-continued political influence well entitle him to the name of "Patriarch of New England." He died at Boston, Dec. 23, 1652.

COTTON.

CHAPTER I.

Cotton Production and Consumption.

Out of nearly twenty varieties of the cotton plant (*Gossypium*), two only are cultivated in the United States. The first of these is the "Sea Island" (*G. Barbadense*), which is grown upon the islands on the coast of South Carolina, in Florida, and upon the coast of Texas. This produces a fibre well known for its length and silky quality. It is used in the finest work for laces, spool cotton, fine muslins, and other similar purposes, but it constitutes a very unimportant part of the cotton crop. (See Table I.)

See Vol. VI. p. 427 Am. ed. (p. 482 Edin. ed.)

Table I.—*Sea Island Cotton.*

Season.	Florida.	Georgia.	S. Carolina.	Texas, etc.	Total crop.	Shipments. To North. ports.	Shipments. To Europe.
1874–75.....	8,139	1,074	7,308	166	16,687	7,877	8,972
1875–76.....	7,598	2,121	4,722	74	14,515	7,938	6,418
1876–77.....	10,832	2,558	4,933	29	18,352	10,981	6,828
1877–78.....	11,675	3,556	6,249	30	21,510	13,031	9,413
1878–79.....	10,214	2,052	7,133	202	19,601	10,039	9,062
1879–80.....	11,300	3,420	10,142	.....	24,862	12,119	12,474
1880–81.....	16,950	3,179	14,868	24	35,021	17,059	17,093
1881–82.....	20,992	6,049	10,796	25	37,862	30,147	8,601
1882–83.....	16,898	3,126	16,591	94	36,709	21,941	14,837

The second variety, which constitutes the great commercial crop, is the woolly seed cotton (*G. hirsutum*), which is grown throughout the Cotton States, and forms so important an element in the commerce and industry of the country. (See Tables II. and IV.)

This fibre furnishes the best material for clothing the larger portion of the human race in comfort and at low cost. It is the only fibre which may be gathered and immediately spun and woven, without any mechanical or chemical process of preparation. The finest woven fabric made of cotton yet known in the world is made, even at this present time, with implements as primitive as the flint of the pre-historic races. The Dacca muslin, known as the "woven wind" of India, still constitutes the most perfect specimen of a woven cotton fabric which can be found. Finer yarn has been spun upon modern machinery than that of which this woven fabric consists, but none so perfect as this example of a textile fabric has yet been woven upon modern machinery. In making these fine muslins, the cotton fibre is separated from the seed by the use of a bow of bamboo strung with the gut of an animal; it is carded with the bone of a fish; twisted into thread by the use of a distaff, and woven on a primitive loom made of bamboo reeds. The work is done by a weaver sitting on the edge of a hole in the ground, under the trees in a tropical climate, and can only be performed in the early morning, when the atmosphere is slightly humid.

Between this prehistoric type of work and the great factory of modern times there can be found but two really original inventions—the method of extending the strand of cotton prior to twisting by the revolution of rollers, applied first by Arkwright little more than a century ago, and the invention of the saw-gin by Eli Whitney toward the close of the last century. All else in the great factory is but an evolution of apparatus of prehistoric type. Changes have occurred in the detail of each machine, but not in the substitution of new machines upon a different principle.

This fibre, which is so useful and with which the larger part of the human race is clothed, is the wing of the seed, and is composed chiefly of elements drawn from the atmosphere. In the immature seed, before the boll is burst, it is a cell containing watery sap, wrapped in many folds around the seed, to which seed in the variety known as *Gossypium hirsutum* it is attached. When the seed approaches maturity the sap condenses, the fibre ceases to be cylindrical, collapses longitudinally, and takes the form of a twisted ribbon, showing convolutions always in the same direction, something like a corkscrew or a shaving. It then becomes elastic, bursts the boll, and hangs ready to be gathered, or to be blown by the wind, carrying the seed with it. Cotton may be spun, because by means of these convolutions each fibre adheres to the others. Any person may gather the cotton from the boll, and with the finger twist the thread; then by the use of the teeth double and twist again, and make a strong cord of almost any length. All other fibres require mechanical or chemical treatment before this can be done.

Table II.—*American Crops, Exports, and Consumption of Cotton Since* 1841.

Season.	Total crop in thousands of bales.	Exports. To Great Britain.	Exports. To Continent of Europe.	Exports. Total Exports.	Home Consumption. Northern Mills.	Home Consumption. Southern Mills, etc.
1841–42.....	1,684	936	529	1,465	268	No estimate.
1842–43.....	2,379	1,470	540	2,010	325	
1843–44.....	2,030	1,202	427	1,629	347	
1844–45.....	2,394	1,439	645	2,084	389	
1845–46.....	2,100	1,102	565	1,667	423	
1846–47.....	1,779	831	410	1,241	428	
1847–48.....	2,423	1,324	534	1,858	532	75
1848–49.....	2,840	1,538	690	2,228	518	112
1849–50.....	2,204	1,107	483	1,590	488	107
1850–51.....	2,415	1,418	571	1,989	404	60
1851–52.....	3,126	1,669	775	2,444	588	111
1852–53.....	3,416	1,737	791	2,528	650	153
1853–54.....	3,075	1,604	715	2,319	592	145
1854–55.....	2,983	1,550	694	2,244	571	135
1855–56.....	3,665	1,921	1,034	2,955	633	138
1856–57.....	3,094	1,429	824	2,253	666	154
1857–58.....	3,257	1,810	780	2,590	452	143
1858–59.....	4,019	2,019	1,002	3,021	760	167
1859–60.....	4,861	2,669	1,105	3,774	793	186
1860–61.....	3,849	2,175	952	3,127	650	193
1861–65.....						
1865–66.....	2,278	1,262	293	1,555	541	127
1866–67.....	2,233	1,216	341	1,557	573	150
1867–68.....	2,599	1,228	428	1,656	800	168
1868–69.....	2,434	989	458	1,447	822	173
1869–70.....	3,114	1,475	704	2,179	777	80
1870–71.....	4,347	2,368	800	3,168	1,072	91
1871–72.....	2,974	1,474	483	1,957	977	120
1872–73.....	3,874	1,920	756	2,676	1,063	138
1873–74.....	4,130	1,852	959	2,811	1,192	128
1874–75.....	3,831	1,833	841	2,674	1,071	130
1875–76.....	4,632	2,005	1,227	3,232	1,220	134
1876–77.....	4,474	1,994	1,034	3,028	1,302	127
1877–78.....	4,774	2,047	1,309	3,356	1,345	151
1878–79.....	5,074	2,053	1,413	3,466	1,375	198
1879–80.....	5,761	2,554	1,510	3,864	1,574	223
1880–81.....	6,606	2,832	1,733	4,565	1,713	230
1881–82.....	5,456	2,295	1,256	3,551	1,677	287
1882–83.....	6,950	2,886	1,838	4,724	1,759	313
1889–90.....	7,313			5,020		

The history of cotton spinning in this country, as well as in others, shows constant improvement in the condition and earnings of the operatives and increased abundance at lower cost to the consumer. Since 1840, when cotton manufacturing had become an important branch of industry in this country—at which date the mills of the United States were operated by the daughters of the native farmers—such changes have occurred in the perfection of the machinery and the construction of the factory as to have compassed the following results: The number of operatives required to do the work at the present time in higher, lighter, and better ventilated factories is only one-half what it was then. The earnings of the operatives are more than double per hour, nearly double per day, although the hours of work are now only ten to eleven per day against thirteen to fourteen at the former period named, while the cost of the work in the pound or yard of cloth is much less than it was then.

The great alleviation in the labor required for cloth ing the people of this and other lands may perhaps be presented in a yet more striking way. In the Atlanta Cotton Exposition (1882) were to be found the representatives of the art of making homespun fabrics from the mountain section of the South—two carders, using hand-cards; two spinsters, working spinning-wheels; and one weaver, working a hand-loom. The five together, working ten hours, were capable of making *eight* yards of coarse cotton fabric in a day. They are the representatives of a considerable population of the middle or mountain section of the South, whose land had not until recently been penetrated by the railroad, and who have been cut off from commerce with other parts of the country. The same number of persons operating modern machinery in a New England factory are capable of producing 800 yards of the same cloth, or one-hundred-fold as much in a day. There are now about 170,000 persons employed in all the cotton factories of the United States in making woven cotton fabrics. Of these about 10,000 are employed upon goods which are exported; the remainder serve to supply the home demand. If all this work were done by hand, at the measure of those whose work has been described, it would take 16,000,000 of the present population of the United States to make the quantity of cloth now consumed, and the cloth would be of a much coarser kind. When it is considered that by far the larger part of the population of the globe is at this day clothed in cotton fabrics made by hand, the future scope of industry and commerce becomes apparent.

TABLE III., explained in the following report, was prepared by Mr. Thomas Ellison, of Liverpool, in 1879, to show the consumption of cotton in the world at that time. A moderate increase has taken place since the date of this table, but it will suffice to give the rule:

"In the following statement we give an approximate account of the quantity of cotton consumed in each country in Europe and the various groups of countries in Asia, Africa, America, and Australia. The population figures represent thousands (86,260 = 86,260,000); the quantities of cotton and cotton goods represent millions of pounds (142.5 = 142,500,000 lbs.) There are three columns of quantities: First, the raw cotton spun in each country; second, the *weight* of goods and yarns imported into each country from Great Britain; and, third, the total of these

TABLE III.—*Consumption of Cotton throughout the World.*

Countries.	Population in thousands.	Raw cotton consumed.		Goods imported from Great Britain.		Total consumption.	
		Millions of pounds.	Per head.	Millions of pounds.	Per head.	Millions of pounds.	Per head.
Russia	86,260	142.5	1.65	2.6	0.03	145.1	1.68
Sweden and Norway	6,291	24.8	3.94	8.0	1.27	32.8	5.21
Denmark	2,023	.....	.....	5.0	2.47	5.0	2.47
Germany	42,727	249.1	5.83	65.2	1.52	314.3	7.35
Austria	37,331	101.3	2.71	7.9	0.21	109.2	2.92
Holland	4,130	13.8	3.34	43.0	10.41	56.8	13.75
Belgium	5,336	43.2	8.09	17.4	3.26	60.6	11.35
Switzerland	2,776	42.5	15.30	.....	.....	42.5	15.30
France	36,906	230.0	6.23	19.9	0.54	249.9	6.77
Spain and Portugal	21,275	79.9	3.75	25.7	1.21	105.6	4.96
Italy and Malta	26,948	52.8	1.96	51.1	1.59	103.9	3.85
Greece	1,450	.....	.....	6.9	4.75	6.9	4.75
Turkey, Roumania, etc.	15,353	.....	.....	37.0	2.40	37.0	2.40
Total Continent of Europe	288,806	979.9	3.39	289.7	0.99	1,269.6	4.38
Great Britain	34,160	195.7	5.72	.....	.....	195.7	5.72
Total Europe	322,986	1,175.6	3.63	289.7	0.89	1,465.3	4.52
Turkey, Persia, etc.	24,540	.....	.....	38.0	1.54	38.0	1.54
India	250,000	295.0	1.18	330.0	1.32	625.0	2.50
China	435,000	1,000.0	2.29	100.0	0.23	1,100.0	2.52
Japan	33,620	65.0	1.93	20.0	0.59	85.0	2.52
Siam, Java, etc.	12,500	.....	.....	30.0	2.40	30.0	2.40
Total Asia	755,660	1,360.0	1.79	518.0	0.69	1,878.0	2.48
Egypt and North Africa	17,000	.....	.....	34.0	2.00	34.0	2.00
West, South, and East Africa	13,000	.....	.....	28.0	2.15	28.0	2.15
Interior of Africa	200,000	.....	.....	.....	.....	.....	.....
Total Africa	230,000	.....	.....	62.0	0.26	62.0	0.26
United States and Canada	48,850	628.0	12.85	22.0	0.45	650.0	13.30
Central and South America and West Indies	43,250	.....	.....	135.0	3.12	135.0	3.12
Total America	92,100	628.0	6.82	157.0	1.70	785.0	8.52
Australia	2,650	.....	.....	15.0	5.66	15.0	5.66
The world	1,403,396	3,163.6	2.26	1,041.7	0.74	4,205.3	2.99

two. The table also shows the *per capita* consumption in each country of raw cotton, of goods, etc., imported from England, and the aggregate of both. The population of Russia includes that of Asiatic Russia. The whole of the figures refer to the year 1877. In the column of "Goods imported from Great Britain" there is a blank opposite Switzerland, because the shipments are sent *via* other countries. A large part of the Swiss production goes to Turkey and to various continental countries. Part of the production of Holland goes to Java, and part passes to Germany, Switzerland, etc. Belgium also forwards largely to the interior of the Continent. The exceptionally large consumption of cotton in the United States is owing to the smaller *per capita* consumption of wool and flax compared with Europe. Moreover, the figures include goods imported.

"Official reports show that the consumption of cotton goods in India is about two and a half pounds per head per annum. We have assumed that a similar rate of consumption obtains in China and Japan. Russia imports some cotton from her Asiatic possessions; the quantity varies considerably. In 1861 it was only 150,000 poods of thirty-six pounds each; during the American War it rose to 750,000 poods; since then it has fallen off. Some cotton is grown and manufactured in the interior of Africa, but it is impossible to say how much. We cannot take the population as a basis, as estimates of *that* range from 150,000,000 to 400,000,000. We have adopted 200,000,000 in addition to the estimate of the number of inhabitants on what may be termed the margin of the Continent. Some native cotton is also consumed in Turkey and in the various countries of South America. The entire production of cotton in the world may be estimated as follows:

	Pounds.
Imported into and consumed in Europe	2,217,000,000
Consumed in the United States	628,000,000
Native consumption in India, China, etc.	1,360,000,000
Total as above	4,205,000,000
Native consumption in Turkey	20,000,000
Native consumption in Africa, one pound per head	200,000,000
Native consumption in South America, etc.	40,000,000
Received by Persia from Bokhara, etc.	15,000,000
Total crop of the world	4,480,000,000
Equal to bales of 400 pounds	11,200,000
Of which about one-half is grown in the United States.	One-half of the whole is also spun in Europe."

This table, prepared by Mr. Thomas Ellison in 1879, is perhaps the only one which attempts to give a computation of the actual consumption of the world, both with respect to the commercial crop and to that which is made use of in the domestic or hand manufacture, as in China, Asia, and other countries which are still supplied mainly with hand-made fabrics.

Since 1877, however, there has been a vast increase in the commercial crop. The consumption of cotton by the factories of Great Britain, the continent of Europe, and the United States reduced to even bales of 400 lbs. each is stated in thousands of bales as follows:

	Great Britain.	Continent of Europe.	United States.	Total.
1877–78	3,038	2,509	1,841	7,388
1879–80	3,350	2,750	2,120	8,220
1881–82	3,640	3,198	2,302	9,140
1883–84	3,666	3,380	2,244	9,290
1885–86	3,628	3,465	2,278	9,371
1887–88	3,841	3,796	2,530	10,167
1889–90	4,027	4,227	2,731	11,055

The average commercial bale of the United States of the crop of 1882–83 weighed 460 lbs. In the same season the average weight of Egyptian packages was 658 lbs.; of Brazilian, 173 lbs.; of West Indian, 160 lbs.; of Smyrna, 350 lbs.; and of East Indian, 390 lbs. The total consumption of what is here designated as the commercial crops, namely, those which are reported in the markets of the United States and Europe in the year 1882–83, was 9,627,000 bales of 400 lbs. each; equivalent to 8,371,300 bales of the weight of the American bale of 460 lbs. each. The American crop for the year ending September 1, 1890, was 7,313,726 bales, the largest ever raised. The cotton of the United States still retains its supremacy.

How far the increased production of cotton fabrics of Europe and the United States has displaced the hand-made fabrics of other countries since Mr. Ellison's table was compiled it is impossible to say; but it is probable that the larger part of the increased production will be accounted for in the increased consumption of the civilized nations rather than in any very great displacement of the hand-made fabrics of other nations.

Mr. Ellison has used a very conservative estimate in respect to the average use of cotton in China, a country of which a large proportion of a dense population dwells in a climate where the temperature is severe in winter. A better estimate of their consumption, confirmed by a gentleman holding a high official position in the customs department of China, is that the average is 5 pounds per head. The machine-made fabrics of Europe and America combined have as yet reached only a small fraction, not exceeding 5 or 10 per cent. of the people of China.

The United States now produce an annual crop of about 7,000,000 bales of cotton (American weight). From the computations which have been submitted, it seems probable that the unknown crop of cotton of the world is nearly equal to the known or commercial crop. If the Chinese be estimated at 400,000,000 people consuming 5 pounds each, we find in that single country a requirement of 5,000,000 bales of cotton of 400 pounds each; which would give 2,000,000,000 pounds of cloth. Our present crop is made upon an area of about 26,000 square miles, which is nearly twice the area cultivated in 1870; but the area of the ten Cotton States is over 650,000 square miles. (See TABLES IV. and V.) The maintenance and increase of our crop is therefore simply a question of adequate labor, not of land.

This leads us to the consideration of the present condition of those who do the work in making the crop their present methods, and the prospective improvement which may come in the next decade.

Under the former system of slavery, the larger portion of the cotton crop was made by negro labor working on large plantations. The planters, as a class, were intelligent, and made the best use which the nature of slavery would permit them to make of their chattels; but their tools and implements of agriculture were of necessity the heaviest and rudest kind, the slaves lacking the incentive to take care of the tools which they used. The crop was made in large parcels, and was better saved in some respects than it is now. Even lists of cotton of uniform grade could then be obtained more readily than they can at the present time; but the land was scathed and worn out; the seed, which is the exhaustive element in the crop, being mostly wasted. In the Mississippi Valley and upon the bottom-lands the plantation system, after having for a time ceased to be an important factor in making the crop, is now being resumed under new and better conditions. Very able men, capable of organizing and controlling large forces of hired laborers, and who also understand the economy of fair and just treatment, are beginning to apply their powers of organizing to large areas of land, and will presently

establish a reputation for the quality of their crops such as belonged to the most intelligent planters of the old times. But upon the upland section and in Texas the former slaves have scattered or have gone into other occupations; a very large proportion of the upland cotton-crop is now made upon small farms by free farmers and white laborers.

The old plantation cotton-gin and the "buzzard-wing" screw or press are disappearing. The preparation of the cotton is now conducted in public ginneries.

TABLE IV.—*Acreage and Production of Cotton in the United States by Census of* 1880.

States.	Total Area sq. Miles.	Tilled Land Acres.	Acres Planted with Cotton.	Bales Produced.	Cotton Seed, Tons.	Average Product per Acre.	
						Lint.	Seed.
						lbs.	lbs.
Mississippi	46,340	4,924,630	2,106,125	963,111	457,478	219	438
Georgia	58,980	7,690,292	2,617,138	814,441	386,858	148	296
Texas	262,290	7,628,536	2,178,435	805,284	402,642	185	370
Alabama	51,540	6,134,198	2,330,086	699,654	332,336	143	286
Arkansas	53,045	3,431,900	1,042,976	608,256	304,128	277	554
South Carolina	30,170	3,736,090	1,364,249	522,548	248,210	182	364
Louisiana	45,420	2,507,935	864,787	508,569	241,570	280	560
North Carolina	48,580	5,926,087	893,153	389,598	185,058	207	414
Tennessee	41,750	7,700,041	722,562	330,621	157,044	217	434
Florida	54,240	887,472	245,595	54,997	26,902	106	212
Missouri	68,735	13,203,756	32,116	20,318	10,158	300	600
Virginia	40,125	7,358,030	45,040	19,595	9,308	207	414
Indian Territory	64,090	.....	35,000	17,000	8,075	233	466
Kentucky	40,000	8,367,910	2,667	1,367	650	243	486
Total	905,305	79,496,877	14,480,019	5,755,359	2,770,417	189	378

Note.—In addition to the foregoing, one locality in California reported 375 acres planted with cotton, which produced 205 bales and 140 tons of seed. Inquiry was not made in the rest of the State.

TABLE V.—*Acreage in Cotton*, 1870–1883. *Reported by the United States Agricultural Bureau.*

States.	1870–71.	1871–72.	1872–73.	1873–74.	1874–75.	1875–76.	1876–77.
North Carolina	451,714	388,474	450,629	513,717	457,208	621,428	609,000
South Carolina	601,764	523,535	570,652	627,717	571,222	955,050	945,500
Georgia	1,330,491	1,170,832	1,311,331	1,455,577	1,310,020	1,611,702	1,515,000
Florida	140,909	143,727	158,099	167,584	152,501	185,393	165,000
Alabama	1,437,272	1,250,427	1,387,972	1,499,009	1,289,148	1,732,250	1,732,250
Mississippi	1,644,512	1,397,835	1,537,618	1,706,755	1,501,944	2,016,326	1,976,000
Louisiana	920,700	847,044	940,218	1,034,239	827,391	1,415,730	1,260,000
Texas	900,937	774,806	914,269	1,097,122	1,119,064	1,483,500	1,483,500
Arkansas	711,734	597,857	693,512	811,409	722,154	1,133,000	1,133,000
Tennessee	526,184	463,042	518,605	596,395	548,683	780,000	741,000
Total in 10 Cotton States	8,666,217	7,557,579	8,482,905	9,509,534	8,499,335	11,934,379	11,560,250

States.	1877–78.	1878–79.	1879–80.	1880–81.	1881–82.	1882–83.	1883–84.
North Carolina	584,640	590,486	625,915	973,537	1,061,155	1,050,543	1,050,543
South Carolina	917,135	944,649	911,649	1,527,959	1,619,639	1,587,244	1,618,989
Georgia	1,530,150	1,560,753	1,591,958	2,878,851	2,994,005	2,844,305	2,872,748
Florida	166,650	166,650	161,650	257,875	263,032	260,402	257,799
Alabama	1,766,895	1,837,571	1,892,698	2,563,095	2,639,988	2,534,388	2,610,420
Mississippi	2,055,040	2,055,040	2,055,040	2,260,796	2,351,228	2,233,844	2,278,521
Louisiana	1,335,600	1,348,956	1,321,977	916,674	944,174	887,524	931,900
Texas	1,706,025	1,808,386	1,934,973	2,478,054	2,676,298	2,810,113	3,034,922
Arkansas	1,189,650	1,165,857	1,177,516	1,147,274	1,181,692	1,110,790	1,188,545
Tennessee	755,820	740,704	762,925	816,495	840,990	815,760	807,602
Total in 10 Cotton States	12,007,605	12,219,052	12,469,311	15,820,610	16,572,201	16,134,913	16,651,989

Note.—The number of acres planted with cotton in 1879–80, as given by the census, was 14,480,019. This amount was obtained by more careful and exhaustive inquiry than the Agricultural Bureau is able to make each year, and tends to show that the amounts given above, at least for years previous to that date, were also under-estimated. See TABLE IV.

operating for a neighborhood. For the time being, this has led to a great deterioration and want of equality in the upland crop. Different kinds are mixed in the same bale; the process of ginning is carried on more with reference to quantity than to quality; and there has been a steady depreciation, in counteracting which there will be great opportunities for future profit. On the other hand, great intelligence has begun to be applied to the selection of seed in order to produce a finer and longer staple in the healthy upland country; the seed itself is all saved; the oil is expressed and made use of, not only for many purposes in the arts, but as a substitute for lard and for olive-oil as an article of food. The residuum or cotton-seed meal has now become a recognized article of food for cattle and one of the best fertilizers which can be made use of, the seed belonging to each bale of cotton containing nearly 50 pounds of phosphate of lime and phosphate of potash, while the bale itself contains only 4 or 5 pounds.

The "all-cotton" method of farming is gradually yielding to a better system of agriculture and to a greater diversity of crops; and in the upland country cotton is becoming the surplus or money-crop of farmers who subsist themselves on the other products of their land.

The aggregate crop is vastly increased as compared to the time of slavery; the 18 crops made subsequent to the surrender of the Confederate armies came to a total of 75,541,000 bales, while the 18 crops made immediately previous to the war amounted to 53,530,000 bales, showing an excess of 22,011,000 bales for the same period of time since the war. The crop of 1859–60, the greatest before the war, was 4,861,000 bales; that of 1889–90 was 7,313,726 bales.

The whole plant has been made the subject of investigation. Many useful purposes are found for the hulls of the seed, such as packing for axle-boxes upon railway cars; possibly for the manufacture of paper; while the ashes of such hulls as are burned at the cotton-seed oil-mills are an excellent alkali. The stalk may yet prove valuable, as it is full of fibre; and the "motes," as a portion of the refuse of the cotton-gin is technically termed (being immature seed with immature fibres attached), will soon be saved for the making of paper.

It will therefore be apparent that it remained for freedom to disclose the full value and all the uses of this wonderful plant. (E. A.)

CHAPTER II.

COTTON-CULTURE IN THE UNITED STATES.

The parallel of 37° N. lat. somewhat roughly represents the present northern limit of the profitable cotton-culture in the United States, east of California. In the latter State abundant experiments have proved that cotton does extremely well throughout a large extent of country to the N. of that line; and whenever a complete system of mixed agriculture shall obtain in that region there can be little doubt that cotton will be one of its standard crops. Cotton was formerly cultivated in many parts of the State of Missouri, N. of the line in question. The fact that cotton was produced to a noteworthy extent in Southern Illinois during the war of 1861–65, and has been grown there to some small extent in later years, is a significant one. South-eastern Kansas will perfect cotton-seed and fibre in ordinary years. On the Atlantic seaboard the limit of cotton-culture has been since 1865 slowly creeping northward; and now some ten counties of South-eastern Virginia raise cotton for sale. Prof E. W. Hilgard, however, believes that the northward limit of profitable cotton-culture in that region has already been reached. It is a noteworthy fact that Northern Manchuria, with a winter climate apparently more severe than that of New York city, is a cotton-growing region. Russian Turkestan produces cotton reputed to be of high excellence. It is therefore possible that cotton-culture may yet go somewhat farther northward in this country. It is certainly desirable that cotton-seeds from Manchuria, Turkestan, and the northern limits of cotton-culture in Japan, should be planted in our Northern States, if only for the extension of our knowledge as to what is possible in this direction.

All the States which had slave-labor up to 1865 are more or less producers of cotton, excepting only Delaware, Maryland, and West Virginia. The cotton-producing States (arranged according to the amounts of cotton produced) are as follows: Mississippi, product (by census of 1880), 228,739 tons of ginned cotton; Texas, 201,321 tons; Georgia, 193,429 tons; Alabama, 166,168 tons; Arkansas, 152,064 tons; South Carolina, 124,105 tons; Louisiana, 120,785 tons; North Carolina, 92,529 tons; Tennessee, 78,522 tons; Florida, 12,092 tons; Missouri, 5,079 tons; Virginia, 4,654 tons; Indian Territory, 4,037 tons; Kentucky, 325 tons; California, 70 tons. Total, by census of 1880, 1,384,019 tons of cotton-lint, besides 2,770,417 tons of cotton-seed. When acreage of cotton-fields alone is considered, Missouri gives the best returns in cotton. The total area of the agricultural regions of all the cotton-producing States is estimated at 710,265 square miles, and on five-sixths of the varieties of soil included in this estimate cotton has already been raised. See TABLES IV. and V. for further details of the production.

The United States census of 1880 takes no note of the small but interesting culture of cotton still going on in New Mexico and Arizona, and managed almost entirely by Pueblo Indians. This industry is of special interest as a relic of the old native civilization of the American race. Dr. Hilgard observes that the Arizona cotton is to some extent a perennial shrub. Cotton has also been grown in the valley of the Rio Virgen in Utah.

The best and fullest discussion of the soils, climate, fertilizers, and culture required by cotton in the United States is that prepared by Prof. E. W. Hilgard for the United States census of 1880, and published in 1884 as the vols. V. and VI. of the full report of that census. The facts and figures presented by Dr. Hilgard form the basis of the following remarks:

It has been clearly shown that while Mississippi easily takes the first rank as a cotton-producing State, she has not yet begun to approach the limit of her capacity in this direction. That she could easily produce as much cotton as all the States now yield is unquestionable. When the density of population is taken into the account it will be seen that Mississippi has done even better than at first sight appears. In amount of cotton raised *per capita* of the population, Mississippi and Arkansas are very far ahead of all the other States. The fertile bottom-lands of the South-west, though excellent for cotton, are in reality not so productive as the first-class uplands in their vicinity. It should not be forgotten that the great

natural superiority of the cotton-lands of the Mississippi Valley over those of the Atlantic slope is at present to a great extent counterbalanced by the more careful and systematic tillage which prevails in the latter, and by the more general use of fertilizers. A fact of great significance is the present high standard of North Carolina as a cotton State, as compared with the former low average shown by the census returns. Without hesitation we may refer this gratifying improvement to improved tillage, and especially to the now very general use of fertilizers in that State.

Soils Suitable for Cotton-culture.—It has been often remarked that while the rich alluvion of the Mississippi bottoms is admirably adapted to cotton-raising, the very best results come from such uplands as the Mississippi "buckshot" soils. At the same time, given a suitable climate, and suitable fertilizers, judiciously applied, almost any soil if well cultivated will grow cotton. Not only on the Atlantic slope but in the vicinity of the Gulf, the poor pine-lands are made to produce a certain amount of cotton. The recent marked extension of the culture of cotton on these light lands is very significant. Such lands, however, can scarcely be planted with cotton so as to produce a profit, unless fertilizers are used. On the other hand, some of the heavy, "waxy" and "hog-wallow" lands are hardly arable; and although if one could work them they might be made to grow cotton, it is probable that the crop would not pay its cost. *Lime* seems essential to a cotton soil. It acts probably not so much as a direct fertilizer as an agent in rendering available the proper plant food already existing in soils. Comparatively few southern soils, even of the lightest, are markedly deficient in potash, except in the older States. Fertilizers abounding in phosphoric acid, lime phosphates, and nitrogen compounds, rather than those rich in potash salts, are therefore the ones most sought for on cotton plantations. Fortunately the "phosphate-rock" of South Carolina is abundant and cheap. In the South-west a very useful subsidiary manure is found in the "bat guano" and richly nitrogeneous potassic earth of caves. Considerable use is made of this substance in some places. Far more prevalent, however, is the use of cotton-seed, or the meal or oil-cake thereof, as a fertilizer. Green manuring, by turning under cow-pease, or some other similar crop, is often practised with the best results. The cotton-stalks, or their ashes, are very generally returned to the land. Excellent marls and limestones abound in many parts of the cotton-belt, but their value is generally overlooked. The resting or fallowing of "tired" lands is also practised; but the practice is an evil one, as ordinarily managed, since it has been shown that in many cases soils lying idle are actually going to waste. An intelligent rotation of crops is a thing as yet quite unknown to many a cotton-grower; and yet upon its introduction depends the preservation of the fertility of vast areas of good cotton-land. A very important and saving factor in the problem of the restoration of worn-out cotton-land is this: that in many places it is only the thin upper layer of soil that has been exhausted. Deeper ploughing and more thorough tillage will often restore such lands to a good degree of fertility. Smaller holdings and the substitution of the wage system for the present plan of paying the laborer by a share of the crop will tend strongly to bring about cleaner and better culture.

The method of cultivation varies somewhat in different regions. Taking for a standard the well-approved system of culture that prevails in Georgia, where the best methods are very generally followed, we may give the following as an outline: The land is first laid off in beds, deep furrows being drawn 3½ or 4 feet apart, against which the soil is bedded up by means of turn-ploughs. Fertilizers are laid in the furrows and ploughed under; or in other cases the bed is trenched by two furrows, one of which receives the fertilizer, and the other the seed. Far too little attention is usually given to the selection of the seed. Sometimes the seed is soaked in water, and then coated with lime-phosphate or other fertilizer—a process which quickens the germination of the seed. From 1 to 3 bushels of seed are applied to the acre. Planting usually is done in April or May. The young plants should show themselves in 10 days, or less. The plants are at once "barred of" by ploughing or scraping the dirt away from the row. The "chopping out" of young plants now follows, by means of which the drill or row of plants is turned into a succession of hills, say 10 inches apart, with 2 strong plants to the hill. A "sweep" cultivator now throws back the earth to the plants. Cotton should have a continuous hoeing, first by horse-power, and later by hand; the whole ground being gone over from 3 to 5 times in the season. The cotton-bloom begins to show when the plant is 8 weeks old, and in 6 weeks more the bolls begin to open. Picking should begin at once, and should be repeated every month at least. Frost often kills the bolls by November 1st, but the picking is kept up till Christmas. The following table shows the dates of the earliest killing frosts at various points in the cotton States as reported by the United States Weather Signal Bureau for the years 1881 and 1882:

	1881.	1882.
Nashville	Oct. 20	Oct. 24
Knoxville	Oct. 26	Oct. 25
Chattanooga	Nov. 4	Nov. 14
Vicksburg	Nov. 4	Nov. 14
Charlotte, N. C.	Nov. 4	Nov. 19
Atlanta	Nov. 4	Nov. 22
Little Rock	Nov. 13	Nov. 18
Shreveport	Nov. 20	Nov. 14
Denison, Texas	Nov. 20	Nov. 21
Wilmington, N. C.	Nov. 24	Nov. 20
Memphis	Nov. 24	Nov. 13
Mobile	Nov. 25	Nov. 14
Montgomery	Nov. 26	Nov. 15
Jacksonville, Fla.	Nov. 25	Nov. 22
Augusta	Nov. 26	Nov. 22
Pensacola	Nov. 25	Nov. 29
Indianola, Texas	Nov. 25	Nov. 30
New Orleans	Nov. 25	Dec. 8
Charleston	Nov. 26	*None.*
Galveston	*None.*	Jan. 9 '83

An "ideal cotton-fertilizer" is said to be produced by a mixture with the following ingredients, in the proportions here given: "Thirty bushels of cotton-seed, 30 bushels of stable-manure, 400 pounds acid lime-phosphate, and 200 pounds of kainit." It is recommended to manure in the drill for several years, or until the ground becomes charged with humus, after which the manure is broadcasted and plowed under. Some excellent planters have the rows run both ways, so that the plow or horse-hoe can be made to do nearly all the work of the hand-hoe. Cotton-pickers receive from 50 to 75 cents per hundred pounds. The total cost of cotton production ought not to be more than from 7 to 10 cents a pound. Rigid and most useful inspection laws have been passed in several

or the States for the protection of the buyer of commercial fertilizers.

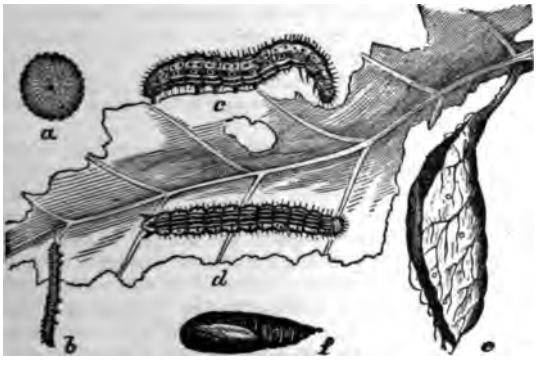
The most important *insect-enemies* of the cotton-plant are the COTTON-WORM, (see Chapter III. of this article), and the cotton-boll-worm, for which see the article AGRICULTURE, Vol. I., p. 141. The other principal enemies of the cotton are *weeds*, and chiefly the crab-grass, of several species.

Exhaustion of the Soil.—Cotton, if properly managed, is by no means one of the worst crops to exhaust soils. Supposing that all the stalks, hulls, and seeds were returned to the ground, the exhaustion produced by the shipping of lint-cotton would be a mere trifle. Four hundred pounds of the lint contain ½ lb. of potash and ½ lb. of phosphoric acid. Cotton-seed oil can be shipped with no appreciable waste of plant food. It appears, then, that the exhaustion of cotton-soils is at present largely due to the removal of the valuable oil-cake, which abounds in the richest elements of plant-food. The soils now exhausted are those which, in their virgin state, were among the most productive. Improvident culture, therefore, is the chief cause of the evil. Another and hitherto neglected source of waste is the washing and gullying of cotton-lands in the heavy rains. This wastage occurs chiefly in fields which are lying idle, and are supposed to be recovering strength for new crops. Dr. Hilgard, in his admirable reports on the agriculture of Mississippi, was the first to give this subject adequate attention.

CHAPTER III.

THE COTTON-WORM

The Cotton-worm (*Aletia xylina*, Say) has been known in the United States since 1793, about which time it was probably introduced from the West Indies. The principal years of injury have been 1804, 1825, 1846, 1868, and 1873. It was first described in 1827 by Thos. Say, from specimens received from Dr. Capers, of Georgia, as *Noctua xylina*, but it is now placed in *Aletia*, a genus neverproperly characterized or defined and doubtfully separable from *Anomis*. During recent years the species has been considered as identical with



Aletia xylina: *a*, egg, enlarged; *b*, *c*, *d*, larva in different positions; *e*, cocoon; *f*, pupa.

the *Aletia argillacea* of Hübner, but a careful study of Hübner's figures and description shows marked points of difference, and the better judgment of experts retains Say's specific name, about which there is no doubt.

The damage done by this insect to the cotton crop since 1793 is enormous. The estimates in Bulletin III. of the United States Entomological Commission place the average loss in a year of ordinary abundance at about $13,000,000. Up to the year 1878 our knowledge concerning the natural history of this species was of the most unsubstantial nature. In 1874 Mr. A. R. Grote proposed, as original, an old theory that the Cotton Worm is not a permanent denizen of the

Cotton Moth: *a*, with wings expanded; *b*, with wings closed.

United States, but that it immigrates hither every year in the spring or early summer from South America *via* the West Indies, and dies out again during the winter.

Recent investigation has resulted in the clearing up of most of the doubtful points in the life-history of the insect and in improved means of counteracting its injuries. The theory of annual importation from foreign lands has been disproved, and it has been conclusively shown that the insect hibernates as a moth in the more southern portions of the Cotton Belt, though in small numbers. The worms make their appearance in detached localities in March and April, and from that time on until late in the autumn they continue multiplying at the average rate of one generation a month. Circumstances may, however, at any point during the season conspire to bring about a comparatively sudden and rapid increase. The eggs are most frequently laid on the under side of the larger leaves, and the larvæ at first feed also on the underside thereof. The pupa is formed above ground, and usually in a leaf rolled together with a slight web of silk. The moth begins flying just before sun-down and feeds on nectar and saccharine exudations of various plants, principally, however, on that of the extra-floral glands of the cotton-plant itself. It also bores into and sucks the juices of most ripe fruits. The worms are preyed upon by many birds and predaceous insects, and no less than fourteen species of hymenopterous and dipterous parasites are known to attack them.

Remedies. Among the many remedies which have been proposed, none have proved so satisfactory as Paris Green or London Purple or some other preparation of arsenic in solution, or rather in suspension, as the two first mentioned are imperfectly dissolved in water. The use of Paris Green was first proposed by Dr. Riley in 1872 and the second in 1878, and they have proved, all things considered, a great boon to the planter. Both are used in the proportion of one-half pound of the powder to forty gallons of water. Since the introduction of these poisons the energy of experimenters has been devoted principally to the devising of the most perfect and most economical spraying machines. Many have been invented.

For full details in reference to this insect and the

different remedial measures and mechanical appliances that have been found useful in checking its ravages, see *Bulletin III. of the United States Entomological Commission*, published under the Interior Department, January, 1880, and the *Special Report on the Cotton Worm*, published under the Department of Agriculture, July, 1880.

The following summary of established facts is from the *New Orleans Democrat*, Sept. 21, 1880:

1. The first worms appear in small numbers, much earlier than has been hitherto, or is usually, supposed, and generally in the same spots year after year, in hibernating centres or regions where the parent moth survives the winter.

2. These first worms appear much earlier than the so-called "first crop" which attracts the attention of the planter, and they may be looked for early in May, or even during the last days of April. While young their presence is most readily detected by the pale, transparent spots they make on the leaves, which spots are a sure indication either that the worm is present or that it has been, for these early worms are frequently swept entirely off by their enemies.

3. The eggs in early summer are laid on the under side of the leaves, and very uniformly on the older leaves about the middle or lower third of the main stem, and the young worms feed there for a few days, producing the spots above described, before ascending to the more tender leaves.

4. The parent-moths, while fond of all sorts of sweet exudations and ripe fruits, obtain their chief nourishment in early summer from the glands on the under side of the leaves and on the involucre. They suck up solid particles, and may be killed by poisoning the sweets they feed on. (C. V. R.)

CHAPTER IV.

Cotton Manufacture in the United States.

The great perfection attained in Cotton Manufacture, and its wonderful development within the past century, are due to the inventive skill and untiring energy of the mechanicians of Great Britain and the United States. In 1793 the saw cotton-gin was invented by Eli Whitney, a citizen of Georgia, but a native of Massachusetts. The importance of this invention to the cotton manufacture cannot be over-estimated, for it was the one thing needed to insure a sufficient supply of the raw material to meet the requirements of the increasing machinery for spinning and weaving. The result of Whitney's invention was the rapid extension of the culture of cotton in the United States, and its permanent establishment as one of the leading staples of the country. Previous to the introduction of the "Saw gin," lint cotton had been separated from its seed by the use of what were known as "roller gins." The process was almost identical with that in use in India centuries ago, and was slow and expensive. The new gin separated lint from seed in much less time, and at much less cost, than had been done by the old plan. As it also increased the quantity of lint made from "seed cotton" (or cotton as gathered from the field), it is easy to see how Whitney's invention greatly enhanced the planters' profits, and thus gave so great a stimulus to cotton-planting.

See Vol. VI. p. 450 Am. ed. (p. 506 Edin. ed.)

In 1775 a stock company was formed in Philadelphia for the purpose of spinning cotton by machinery, and this was probably the first attempt at cotton manufacture in the United States. In 1780 a company was organized at Worcester, Mass., for spinning and weaving cotton, and it met with a fair measure of success. The first cotton-mill in the United States, operated upon the factory system, was erected in 1787, at Beverly, Mass., by a stock company, at an outlay of about £4000. So great an interest was felt in the success of this enterprise that the legislature of Massachusetts assisted it with grants of money, amounting to £1500. In 1786 machinery for carding, roving, and spinning cotton, after Arkwright's and other English methods, had been erected for Col. Hugh Orr, at East Bridgewater, Mass., by Robert and Alexander Barr, machinists from Scotland. Notice was given in the newspapers that the machines could be seen and examined by the public, and that the manner of working them would be explained.

In regard to the establishment of the cotton manufacture in the United States, special credit is due to Samuel Slater, a native of England, who emigrated to this country in 1789. In the following year he made with his own hands a series of Arkwright machines, and started at Pawtucket, R. I., a cotton-spinning factory. Taking the water-wheel of an old fulling-mill he used it to give power to three carding, one drawing and roving machine, and 72 spindles. As the cotton of the Southern States was then badly cleaned, his supply was drawn from the West Indies. In 1794 he made the first cotton-thread. In 1806 the firm of which he was a member founded the village of Slatersville, R. I., where they introduced in their new mill some of the improvements in machinery then used in England. Before 1800, however, many of Slater's models and patterns were used by others, and factories had been established at New Haven, Norwich, Conn., Philadelphia, New York, Boston, and other places, in about the order named. These factories were all employed in carding, roving, and spinning cotton by machinery, but the total quantity of cotton consumed by them in 1800 was only 500 bales. The weaving of cloth was done on hand-looms until 1813, when Messrs. Francis C. Lowell, Patrick T. Jackson, and Paul Moody started at Waltham, Mass., the first mill in the United States in which power-looms were used. The power-loom, invented by Dr. Cartwright, had been in use in the British mills since 1787; but, in those days, intercourse with the mother country was so restricted, and the secrets of inventors so jealously guarded, that its principles and mode of construction were unknown in America.

As early as 1790 yarns and cloth were manufactured in a mill with 84 spindles at Statesburg, S. C. In 1822 the first cotton-mill was erected in Lowell, Mass., now the largest cotton manufacturing centre in America. In 1825 there were in the United States about 800,000 spindles, which consumed during that year 100,000 bales of cotton. Until 1845 the cotton manufacture was chiefly confined to the Eastern and Middle States. There were very few mills in the South; but in that section a small quantity of cotton was yearly spun by the old-fashioned spinning-jennies, and woven on hand-looms for home and plantation use. [illegible] the present time this primitive method of [illegible] ture is followed in some portions of [illegible]

A review of the growth of cotton [illegible] that this great industry has kept [illegible] progress of American develop[illegible] were in operation in the Uni[illegible] ning 1,250.000 spindles, and [illegible]

atives. These mills took from the crop of 1831–32 only 174,000 bales of cotton. In 1890 there were fully 14,550,000 spindles, giving employment to over 200,000 persons. Their taking from the crop of 1889–90 was 2,731,000 bales.

The following table, showing the progress of cotton manufacture in Great Britain and in the United States, affords an interesting comparison:

	British Mills.		American Mills.	
	Spindles.	Bales Used.	Spindles.	Bales Used.
1850–51	21,000,000	1,667,000	3,600,000	464,000
1860–61	33,000,000	2,635,000	5,200,000	839,000
1871–72	36,000,000	3,132,000	7,500,000	1,097,000
1881–82	41,000,000	3,439,000	12,150,000	1,833,000
1882–83	42,000,000	3,734,000	12,660,000	2,456,000
1883–84	43,000,000	3,388,000	13,300,000	1,855,000

It will be seen that between 1851 and 1882 British spinners increased their spindles 95 per cent., and their consumption of cotton 106 per cent.; while American spinners increased their spindles 237 per cent., and their consumption of cotton 317 per cent. The ratio of increase has been more than twice as great in the United States as in Great Britain.

The following table gives the statistics of the cotton manufacture in the several States, according to the census of 1880:

TABLE VI.—*Cotton Manufacture in the United States*, 1880.

States.	Mills.	Spindles.	Bales of Cotton Consumed.	Capital Invested.	Operativ's.	Paid for Wages.	Cost of Cotton.	Value of Product.
Maine	24	695,924	112,381	$15,292,078	11,843	$2,946,146	$6,234,901	$13,459,364
New Hampshire	36	944,053	157,673	19,877,084	16,637	4,284,174	8,629,603	17,848,176
Vermont	7	55,081	7,404	936,096	735	161,748	458,607	730,865
Massachusetts	175	4,236,084	574,857	72,291,601	61,939	15,857,380	31,107,154	72,035,444
Rhode Island	115	1,764,569	167,480	28,047,331	21,918	5,468,115	10,457,770	23,170,924
Connecticut	82	936,376	109,703	20,310,500	14,419	3,494,231	6,281,939	15,775,062
New York	36	561,658	64,614	11,399,638	9,379	1,968,001	3,981,106	8,346,842
New Jersey	17	282,221	21,069	3,807,750	4,273	1,156,964	1,319,422	4,568,256
Pennsylvania	59	425,391	83,997	10,331,985	10,024	2,464,847	4,749,428	10,912,240
Delaware	8	46,188	7,512	874,570	695	145,569	427,855	1,308,038
Maryland	19	125,706	51,537	4,600,816	4,168	765,330	2,780,715	4,682,416
Ohio	4	13,328	5,323	670,000	484	104,500	258,198	637,000
Indiana	4	33,396	11,558	1,090,300	720	162,829	679,911	1,155,030
Illinois	2	4,860	2,261	240,000	237	47,886	110,969	219,862
Michigan	1	5,100	600	20,000	515	97,680	336,984	522,980
Wisconsin	1	10,000	3,173	200,000	88	16,800	36,000	70,000
Minnesota	1	1,708	400	5,000	277	67,210	180,072	328,389
Utah	1	432	54	20,000	22	6,400	22,000	35,000
Total in Northern States	592	10,092,075	1,381,596	$190,014,449	157,887	$39,120,230	$77,718,333	$175,290,545
Virginia	8	44,340	11,461	1,190,100	29	2,100	3,223	7,937
North Carolina	49	92,385	27,642	2,855,800	1,112	169,789	601,796	1,037,412
South Carolina	14	82,334	33,624	2,776,100	3,270	438,603	1,125,984	2,528,996
Georgia	40	198,656	71,389	6,348,657	2,197	340,006	1,723,187	3,750,770
Florida	1	816	350	11,000	6,372	1,119,306	3,591,554	6,216,701
Alabama	16	49,432	14,702	1,246,500	33	5,000	16,000	25,000
Mississippi	8	18,568	6,411	1,122,140	1,490	225,779	729,202	1,228,020
Louisiana	2	6,096	1,358	195,000	716	133,214	301,226	679,094
Texas	2	2,648	246	50,000	108	12,572	68,018	82,776
Kentucky	3	9,022	4,050	360,000	71	2,466	11,280	21,600
Tennessee	16	35,736	10,436	1,145,600	354	63,850	188,856	418,387
Arkansas	2	2,015	680	75,000	998	180,172	508,305	921,679
Missouri	3	19,312	6,399	890,000	64	12,339	25,000	50,000
Total in Southern States	164	561,360	188,748	$18,265,897	17,300	$2,800,776	$9,227,392	$17,483,415
Grand Total	756	10,653,435	1,570,344	$208,280,346	175,187	$41,921,006	$86,945,725	$192,773,960

The ures in the table refer to regular cotton-mills, ring yarns and fabrics made entirely of cot- the cotton consumed in these establish- 100 bales were used in woollen-mills, hosiery- and felt- and hat-factories; 40,597 bales in the re of mixed fabrics, not sold as cotton goods, d largely of cotton; and about 15,000 bales and upholstery work. These additions figures for the cotton-mills proper would make cotton consumption of the country for the 1,721,105 bales.

eful investigation it has been estimated by d Atkinson, special agent of the census for factures, that 30,221 bales more were con- ing the commercial year ending August 31, n during the year covered by the census re- Ju 1, 1880). This, added to the cen- 1,755,773 bales as the consumption for cotton season of 1879–80.

e em ment. during the 59,685 were men, 15,107 boys, 84,539 women, and 13,213 girls The working hours were 10 to 11 per day, and the wages for the year averaged $244, or 81 cents per day for 300 working days. The factories not classed as regular cotton-mills, but manufacturing mixed goods, containing a large proportion of cotton, gave employment to 12,928 persons; while establishments for printing, dyeing, and bleaching cotton and mixed goods, employed 12,866 operatives. Add to these the 2115 officers and clerks of cotton-mills, and the total number of persons engaged in the different branches of cotton manufacture in 1880 reaches 200,453.

In 1850 the regular cotton-mills gave employment to 94,956 persons; in 1860 to 122,028; and in 1870 to 135,369. It will be observed that, while the number of spindles increased nearly 200 per cent. between 1850 and 1880, the number of operatives increased only about 80 per cent. This is due to the greater efficiency of modern machinery and the growing tendency to concentrate work in large establishments.

Since 1880 the increase in spindles, by the erection

of new mills and enlargement of old establishments, has been very considerable. It is estimated that on September 1, 1884, there were fully 12,250,000 spindles in the Northern and 1,050,000 in the Southern States, making a total of 13,300,000 spindles in the entire country—an increase of 2,650,000 spindles within four years. During the same time the cotton spindles of Great Britain advanced from 39,750,000 to 43,000,000, and those of the continent of Europe from 20,800,000 to 22,650,000—an increase of about 8 per cent. for Great Britain and 9½ per cent. for the continent, against an American increase of 25 per cent. The Southern States in 1890 had 1,625,000 spindles.

While the English were the first to use machinery for spinning and weaving, the Americans have made many inventions which have facilitated and cheapened the cotton manufacture. All of the American methods which possess merit have been adopted in England, and all English improvements have been introduced into America. This interchange of the inventive skill of the two countries has been constantly going on, so that at this time neither can boast of any especial advantages over the other in patented machinery.

British machinery for spinning and weaving—and, in fact, for all purposes directly connected with the cotton manufacture—is considered more perfect in its finish and details than that made in the United States, and is used in many of the best-appointed mills. American steam-engines, however, and all appliances for furnishing and regulating motive power, are regarded as superior to those of foreign make, and are in general use. As yet, the American mills manufacture, besides yarns and thread, chiefly the coarser descriptions of goods, such as shirtings, sheetings, drills, checks, print cloths, bags, etc. Some fine fabrics are, however, made by Northern mills. In Great Britain the average consumption of cotton in the year 1883–84 was about 34½ lbs. per spindle, while in the United States it was about 65 lbs. This fact illustrates the relative fineness of the goods manufactured in the respective countries.

It must be said to the credit of the American manufacturers that their goods are generally free from adulteration, honestly made, and correctly branded. They stand deservedly high in the Chinese and Indian markets, where they come in competition with British goods which are often badly adulterated with sizing and other filling. American cotton manufactures are generally sold for home consumption, the export trade not yet having attained proportions of great importance. Within the past few years a prominent feature of the cotton manufacturing industry has been its rapid development in the cotton-growing States. The general recuperation of the South from the losses entailed by the war of 1861–65, and the misgovernment which followed in its wake, has been marked by earnest and energetic efforts for the establishment of cotton manufacture in this section. Many of the Southern municipal and State governments have encouraged the movement by granting exemption from taxation of capital employed in cotton manufacture. In the year ending August 31, 1878, the Southern mills took from the crop 147,000 bales of cotton; and in the season 1883–84 their takings were 340,000 bales—an increase of 132 per cent. During the same period the Northern mills increased their takings of cotton from 1,341,000 to 1,515,000 bales—a gain of about 13 per cent. Southern factories possess the advantages of proximity to the cotton-fields and a climate whose mildness insures them against those interruptions to work which, in severe winters, are often causes of inconvenience and loss to Northern mills. Other advantages over the North are cheaper land (for sites for factories and dwellings for operatives), and cheaper building material, fuel, and labor. The working hours also are longer. Nearness to the cotton-fields means not only a saving in cost of transportation of the raw material, and the reduction to a minimum of the inevitable loss in weight by handling, but also a better selection and lower prices. Southern mills can save the profits and charges which the Northern mills must pay to brokers and middle-men. The loss in weight on cotton, in transportation to the Northern mills, is considerable; and to this must be added the loss by the shrinkage in weight on the larger stocks of cotton which Northern mills have to carry in consequence of their greater distance from the sources of supply.

The Northern mills certainly possess great advantages in their proximity to the large cities, which serve as distributing points for their production; in the facilities afforded by the many machine and repair shops which have sprung up around them; and in the better supply of skilled labor. It may fairly be questioned, however, if their advantages equal those possessed by the mills of the South.

The cost of transportation to Northern and Western markets of the product of Southern mills, in excess of what they can sell to their own trade, is certainly much less than the freight paid by the Northern mills on all the cotton which they use. The additional first cost of machinery to Southern mills, and perhaps the somewhat greater expense for subsequent repairs, are far more than balanced by their cheaper fuel and labor, and more certain water-power. It is thought that the dividends made by Southern mills in 1881 averaged 14 per cent., while those of the Northern mills averaged scarcely 7 per cent. on the capital invested.

As the Southern States have an abundance of unfailing water-power, inexhaustible supplies of coal, iron, and lumber, as well as a soil whose fertility insures abundant and cheap food, why should they not succeed in their efforts to establish cotton manufacture? Economical reasons seem to require that the cotton crop of the country be spun in the section of its growth, and the proportion of it needed for the looms of the world shipped in the shape of yarns instead of cotton. Cotton culture and cotton manufacture in this country are capable of vast extension. Since 1851 the extent of the cotton crop has been doubled, while American spinners have, within the same time, increased their consumption over 300 per cent.

(A. B. S.)

CHAPTER V.

Cottonseed Products.

As long ago as the middle of the last century attempts were made to util the seed of the cotton plant. In 1769–70 samp f oil expressed from the seed, made by the Morav of Bethlehem, Pa., were presented to the American sophical Society. In 1783 the Society for the Encou of Arts and Commerce, London, having had ion drawn to the value of oil seed-cake as a f d to West Indian planters a for oil expressed from cot the seed remaining, in of oil and 5 cwt. of

smaller quantities. These premiums were annually renewed for six years without award. The South Carolina Agricultural Society, soon after its organization, in 1785, offered a premium medal for oils from cotton and other seeds. A patent was issued in 1819 for a preparation of food from cottonseed, and in 1820 one for a method of extracting oil from the seed. In 1833 a large manufactory of oil from cottonseed was established at Natchez, Miss., and others were building at Mobile, Ala.; Florence, Ga., and Petersburg, Va.; but the business was not then successful and their work was intermittently carried on for many years. (*Bishop's Hist. Amer. Manuf.*, ii. 81.)

It is only within the past 15 years that the seed has attained a commercial value. Previously, almost the entire crop, if utilized at all, was so utilized by restoring it to the soil as a fertilizer. Within the period named the growth of the cottonseed interest has been very rapid. At the fifth annual convention of the Cottonseed Crushers' Association, held in Chicago, June, 1883, it was stated that there were 101 mills in the United States, 85 of which were in active operation throughout the year; in 1884 there were 130. The united capacity of 56 of these mills is 4070 "boxes." There are now about 100 mills scattered throughout the cotton belt, but principally in the Valley of the Mississippi, which represent over $7,000,000 of capital. Five-sixths of the manufactured products are used for home consumption.

Our annual cotton-crop exceeds 7,000,000 bales, which, after reserving the necessary seed for planting, yields about 3,500,000 tons of cottonseed. This seed, manufactured into oil, meal-cake, and other products, should yield in value not less than $100,000,000. Compare TABLE VII., which gives the detailed estimate of the Census department, based on the crop of 1879. The amount crushed at the oil-mills is about 600,000 tons. Within the past ten years the value of the seed at the mills has doubled. The planters receive $5 to $10 per ton, according to their distance from the mills. The value at the mills ranges from $12 to $19; the difference between these values is the cost of freight, as in this business, as now carried on, the only middle-man is the carrier. The *Times-Demo-*

TABLE VII.—*Cottonseed Production of* 1879; *with its Possible Uses and Value.*

States.	Cottonseed.			Possible Products.			
	Total, in Tons.	Reserved for Seed.	Convertible.	Crude Oil. Gallons.	Oil-cake.	Cotton.	Hulls.
Alabama	332,336	38,446	293,890	10,286,150	110,209	3,233	143,712
Arkansas	304,128	17,209	286,919	10,042,165	107,594	3,156	140,303
Florida	26,902	4,052	22,850	799,750	8,569	251	11,174
Georgia	386,858	43,181	343,677	12,026,695	128,879	3,780	168,068
Indian Territory	8,075	412	7,663	268,205	2,873	84	3,748
Kentucky	650	44	606	21,210	227	7	296
Louisiana	241,570	14,269	227,301	7,955,535	85,238	2,500	111,150
Mississippi	457,478	34,720	422,758	14,796,530	158,534	4,650	206,729
Missouri	10,158	530	9,628	336,980	3,610	106	4,706
North Carolina	185,058	14,736	170,322	5,961,270	63,871	1,874	83,287
South Carolina	248,210	22,510	225,700	7,899,500	84,638	2,483	110,367
Tennessee	157,044	11,922	145,122	5,079,270	54,421	1,596	70.965
Texas	402,642	35,944	366,698	12,834,430	137,512	4,034	179,315
Virginia	9,308	743	8,565	299,775	3,212	94	4,189
Total	2,270,417	238,718	2,531,699	88,609,465	949,387	27,848	1,238,001

States.	Market Value of Products.						Selling Price of Seed.	Manure Value of Seed or Cake.
	Crude Oil.	Oil-cake.	Cotton.	Hulls.		Total.		
				Fuel.	Ash.			
[illegible]	$3,085,845	$2,204,180	$517,280	$513,052	$28,740	$6,349,097	$2,057,230	$5,348,798
[illegible]	3,012,649	2,151,880	504,960	500,882	28,060	6,198,431	2,008,433	5,221,926
[illegible]	239,925	171,380	40,160	39,891	2,240	493,596	159,950	415,870
[illegible]	3,608,608	2,577,580	604,800	599,967	33,610	7,424,566	2,405,739	6,254,921
Territory.	80,461	57,460	13,440	13,380	750	165,491	53,641	139,467
[illegible]	6,363	4,540	1,120	1,056	50	13,129	4,242	11,029
[illegible]	2,386,661	1,704,760	400,000	396,806	22,230	4,910,457	1,591,107	4,136,878
[illegible]	4,438,959	3,170,680	744,000	738,023	41,350	9,133,011	2,959,306	7,694.196
[illegible]	101,094	72,200	16,960	16,808	950	208,012	67,396	175,230
[illegible]	1,788,381	1,277,420	299,840	297,335	16,660	3,679,636	1,192,254	3,099,860
[illegible]	2,369,850	1,692,760	397,280	394,010	22,070	4,875,970	1,579,900	4,107,740
[illegible]	1,523,781	1,088,420	255,360	253,155	14,190	3,135,096	1,015,854	2,641,220
[illegible]	3,850,329	2,750,240	645,440	640,155	35,860	7,922,024	2,566,886	6,673,904
[illegible]	89,922	64,240	15,040	14,955	840	185,007	59,955	155,883
		$18,987,740	$4,455,680	$4,419,664	$247,600	$54,692,523	$17,721,893	$46,076,922

crat gives the estimated receipts of seed at New Orleans for the trade year ending Sept. 1, 1882, at 959,000 tons, costing on an average $14, ex-levee, or $14.50 at mill-doors. It estimates the cost of manufacture by the mills of that city as follows: 100,000 tons of seed give to the planter and carrier $1,450,000 before the mills take hold of it. This is equal to a tax of $1 per bale on every bale of cotton received at that port in a year. The mills expend on an average $6 per ton to manufacture this seed into oil and cake, which add $600,000 more, making an expenditure of, say, $2,000,000 annually. This represents 3,500,000 gallons of crude oil, or about 3,000,000 gallons of refined oil, which, at 45 cents per gallon, has a value of $1,350,000; 37,500 tons of cake, worth, at $22.50 per ton, say $844,000; and 4500 bales of lint, worth, at $35 per bale, $157,500—making, with the perquisites and advance prices in retail sales, about $2,500,000, or 25 per cent. net profit. Six mills in New Orleans have a combined capital of $1,500,000, on which is paid annually about 33⅓ per cent. In many places in the South the cake and the hulls pay for the seed and the expense of grinding, leaving the value of the oil a net profit. On the other hand, the planter finds it profitable to haul his seed to the mill and get in return the cake and the hulls, leaving the oil as toll to the crusher. All the products of the seed are clear gain over the old system, when its only value was as a fertilizer, and it was a custom in many places to give the seed to the ginner as toll.

A bushel of seed weighs about 45 or 46 pounds. The relative proportion of husks and kernel was found by Dr. Adriani to be, for Egyptian seed, 37.45 husks to 62.55 kernels. The same writer (*Chem. News*, x. 263) gives an analysis of this seed:

Moisture driven off at 212°	9.520
Gum, mucilage, etc., soluble in boiling water	14.000
Oil extracted by boiling ether	20.880
Albuminous compounds	26.640
Woody fibre	25.185
Ash	3.775

An analysis of the seed (*Gossypium herbaceum*) by M. C. Cloes (*Bull. de la Soc. Chem.*, iii. 46) gave—

Weight of 1 hectolitre	63.00 gr.
Fatty matter in 100 parts, by weight	23.675 "
" " " volume, per hectolitre	15.931 "
Loss in water at 100° C	9.300 "
Ash in 100 parts	3.76 "
Density of oil at 15° C	0.9306"
Weight of 10 grains of oil after 18 months exposure to air	10.397 "

The condition of the oil after exposure to air was liquid, hardly thickened.

Crude Oil.—The crushed seeds yield, on a commercial scale, 12 to 18 per cent. of crude oil, of a dark reddish-brown color, not very limpid or clear, of a specific gravity varying with the conditions of seed and manufacture, depending to a considerable extent upon the quantity of albuminous and mucilaginous matter which it holds in suspension. Dr. Adriani (*Chem. News*, xi. 5) found the specific gravity of one sample, which was an average of twenty-four casks, to be 0.93074 at 54° Fahr.; another sample, also representing a large quantity, he found to be 0.93169. He submitted a portion of the latter sample to a current of steam at 212° Fahr., and on thorough washing with boiling water, which removed the greater portion if not all of the vegetable impurities, found the specific gravity had increased to 0.9343305 at 52° Fahr. Lipowitz gives the specific gravity of crude oil as 0.9280 at 59° Fahr., and Stillwell as 0.9224 at the same temperature. The dark color of the crude oil is due to the presence of a rather dark pinkish, resino-fatty substance contained in minute cells, which are visible to the eye scattered over and through the yellowish-white mass of the seed-kernel, which substance at once oxidizes on exposure to the air.

Refined Oil.—By the processes of refining the crude oil yields 80 to 85 per cent. of a clear, limpid, light-yellow oil, without perceptible odor, and in taste resembling the finest olive-oil. Goldsmith (*Amer. Chem.*, xi. 107) gives its specific gravity at 59° Fahr. as 0.9306; Cloes (*Bull. de la Soc. Chem.*, iii. 46) gives the same; Stillwell gives for the same temperature, refined yellow, 0.9230; white winter, 0.9288; and for cottonseed salad oil, 0.9231. Refined oil solidifies at from 32° to 38° Fahr.

There is such a perfect agreement in all their properties between well-clarified cottonseed oil and the best olive oil that it is difficult even for good judges to distinguish between them. This fact has led to a large export to the Mediterranean ports, from which, mixed with more or less olive oil, it is reshipped to us and to other consumers as "pure olive-oil." The degree to which this deception has been practised was shown by the results of a duty of 14 lire per quintal imposed by the Italian Government upon all imports of cottonseed oil. The law went into operation April 22, 1881. The importations subsequent to April were made under contracts which ran to the end of the year. The average monthly imports of cottonseed oil into Italy from March 1 to Dec. 31, 1881, was 98,640 quintals; it dropped from 98,740 in Dec., 1881, to none in January, 1882, and was but 110 in February. The exports of "olive" oil for the same time were an average of 488,779 quintals per month from March 1 to Dec. 31, 1881, dropping from 677,990 in Dec., 1881, to 52,059 quintals in Jan., 1882, and 102,511 in February. In 1881 there were imported into the United States 216,788 gallons of "olive" oil, valued at $380,425, which paid a duty of $1 per gallon; of this it is probable that at least one-fourth was our own cottonseed oil. Prohibitory duties have been imposed in Spain as well as in Italy, and since that time the oil sent abroad has gone chiefly to Marseilles and Trieste, where it is still used for adulterating olive oil.

Aside from any consumption in manufacturing, its use for cooking purposes and as a salad for the table is noticeably increasing. As a salad oil the prefix "olive" is generally used; and hotel-proprietors, restaurant-keepers, and bakers, in deference to popular prejudice, are careful to keep a knowledge of its use from their patrons. But its intrinsic merits are so great as, with its cheapness, to insure a large demand. At the South and West determined efforts have been made by refiners to introduce it into family use by packing it in attractive forms and widely advertising. These efforts have led the lard-dealers at the West to attribute to them the dulness of their markets in that section. At the last regular meeting of the Baltimore Grocers' Exchange the committee on cottonseed oil reported its great superiority in every respect over lard for cooking purposes. The oil is cleaner, does not become rancid in any season, is more healthy and nutritious, is entirely free from any unpleasant taste or odor, goes

one-half further in cooking, and costs less in the proportion of seven to twelve. The oil can be converted by pressure into a "butter" which is largely used by the Jews, whose religion forbids the use of lard.

The standard weight of refined oil is 7½ pounds to the gallon. The barrels contain, on an average, 48 gallons.

Average Quotations for the year at New York for Prime Oil.

Kind of Oil.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
Crude.....	44	46¾	48¾	42½	46¼	39½	35½	35½	37¾
Summer yellow.	50¼	54⅛	57⅛	51½	52¾	47½	43¼	42½	47⅝
Winter yellow..	58½	63	63½	54½	55¾	51¾	48⅛	53¼	55½

The exports from the United States of the various grades of cottonseed oil, according to the Treasury reports, which are for the fiscal years ending June 30, were, in 1875, 417,387 gallons, valued at $216,640, increasing to 6,967,796 gallons, at $3,225,414, in 1880; in 1881 they were 3,190,836 gallons, valued at $1,465,255; in 1882 they fell to 713,549 gallons, valued at $330,260; and in 1890 they had increased to 13,384,385 gallons, valued at $5,291,178.

Fertilizer and Cattle-food.—In the cotton districts the seed in its natural state is largely used, and is very effective as a fertilizer for corn, cotton, and sugar-cane. Cottonseed meal is said to be the cheapest known source of nitrogen for compounding fertilizers. The seed is fed to a large extent to cattle. The cake which remains after the oil has been expressed is used for the same purposes—to a limited extent in the cotton districts, for there the richer seed is available; but this product of the mills is consumed in the North and West, and exported to England and Germany, both as cake and meal. Were oil-mills more generally established in large cotton-growing districts, it would be profitable for the planters to allow to the manufacturer the remaining lint, oil, and hulls, as toll, and receive the oil-cake to be returned to their fields directly, or through their cattle.

The manure from the cattle fed upon the cake or meal is very valuable. The composition and value of cottonseed cake as a plant-food, compared with linseed oil, has been given as follows (*Mass. Agricult. Report*, 1872–73, p. 167):

	Linseed Cake.		Cottonseed Cake.	
	Per cent.	Pounds in ton of Cake.	Per cent.	Pounds in ton of Cake.
Dry matter.....	88	1971	89.	1994
Ash.....	7	156.8	8	179.2
Phosphoric acid.....	4.92	110.2	7	156.8
Potash.....	1.65	37	3.12	70
Nitrogen.....	4.75	106.4	6.5	145.6
Value of manure from 1 ton.....		$19.72.		$27.86.

Mr. Harris (*Mass. Agricult. Rept.*, 1875) estimates the value of manure obtained from the consumption of 1 ton of corn at $10.75; of linseed oil cake at $31. 1 of decorticated (*i. e.*, husks removed) cot- at $45.26. The experiments of Mr. land (*U. S. Agricult. Rept.*, 1875, p. give the comparative values of manure by the of 1 ton of the food—for cottonseed cake, £6 10*s.*; cottonseed cake, not decorti- and for linseed cake, £4 12*s.* 6*d.*

The several values for manure given above are of course not absolute, but merely comparative.

Care has to be exercised in feeding the cotton-cake and meal to female cattle when with young, as it tends to cause miscarriage. With merino ewes, however, the effect is said to be advantageous. Another important result from feeding sheep upon cottonseed meal is, that the oil in the wool is more abundant than from any other food, and can be converted into the finest curriers' oil.

The exports of oil cake from the United States, in the year ending June 30, 1882, were 421,269,116 pounds, valued at $6,302,828, and in fiscal year 1890 711,704,373 pounds, valued at $7,999,926.

Soap.—The crude oil and the refuse from other processes are used in making soap. Dr. Adriani's experiments (*Chem. News*, xi. 94) gave 291.63 per cent. of the oil, in soft soap, containing, when made, 52.3 per cent. of water. The yield of soap with soda was 169.33 per cent. of the oil, and it contained 38.7 per cent. of water. A lead soap was also prepared by directly saponifying the oil with oxide of lead, as well as by precipitation from the potassa soap by means of a dilute solution of acetate of lead: 100 parts of potassa soap yielded 57.19 parts of dry lead soap. The crude oil alone does not make a very good soap. It is the practice of soap-makers to mix with each part two parts of other fatty substance. The saponification is carried on in the ordinary way. Where there is an excess of cottonseed oil, the soap does not readily separate from its solution by the addition of salt; the separation is facilitated at this stage by the addition of pure water. The soap thus made is decolorized by boiling over a spent lye containing the carbonate of an alkali. (R. H. T. & F. T. T.)

COTTON RAT, a quadruped of the order *Rodentia*, family *Muridæ*, and sub-family *Murinæ*, belonging to the American section of that sub-family, *Sigmodontes;* the *Sigmodon hispidus*, inhabiting the Southern States and portions of Mexico to Guatemala. The size is about that of a half-grown Norway rat, and the general aspect is not very dissimilar; but there are radical differences in the dentition between any murine of the new world and any of the old, the tubercles of the molar teeth being arranged in two series in the former, in three in the latter. The dental formula of *Sigmodon* is *i.* $\frac{1}{1}$, *c.* $\frac{0}{0}$, *pm.* $\frac{1}{1}$, *m.* $\frac{3}{3}$, as usual in *Muridæ;* there are certain cranial characters; the general form is stout, almost as in *Arvicolæ;* profile of head convex, muzzle blunt, hairy excepting the nasal pads; ears large, orbicular, hirsute inside, nearly naked outside, with a well-developed valvular antitragus; whiskers few, soft and short, hardly reaching the ears; the tail nearly naked and scaly (somewhat as in *Mus* proper), from ⅔ to ¾ as long as the head and body; forefeet small, not half as long as the hind, with naked 5-tuberculate palms; the thumb rudimentary, with an obtuse flattened nail; hind-feet very large, 5-digitate, the first and fifth sub-equal in length and very short, the naked soles 6-tuberculate, granular at bases of the toes, smooth behind; pelage long and hispid from much admixture of bristling hairs, above brownish-yellow finely pencilled with black, below grayish-white; tail indistinctly bicolor; soles black. Length of head and body 4 to 6 inches, usually about 5; tail about 3½, but varying from 2½ to 5½; hind-feet 1¼; ear, ¾. There is but one species, which, however, runs into slight varieties in Mexico (*berlandieri* and *toltecus*). It is very common in suitable places in the regions it in-

habits, and sometimes so abundant as to become a serious inconvenience. It is more or less gregarious, and lives in underground burrows, preferably excavated in light sandy soil to no great distance, with several entrances to the main chamber, in which is built a grassy nest. Under some circumstances a nest is constructed above ground in clumps of herbage or beneath heaps of brush. Generally little pathways radiate from the burrows, and along them everything is eaten away. The rice-field mouse (*Hesperomys Oryzomgo palustris*) and the wood rat (*Neotoma floridana*) are near relatives of the cotton rat, and all three may be found together; the resemblance of the former to the cotton rat is very close, but there are generic differences.

(E. C.)

COUES, Elliott, a distinguished American naturalist, was born at Portsmouth, N. H., Sept. 9, 1842. In 1853 his father, Samuel Elliott Coues, removed with his family to Washington, D. C., and the son was educated at Columbian College, whence he graduated in 1861, having previously spent a season in Labrador on a scientific expedition sent out by the Smithsonian Institution. In May, 1862, he became a medical cadet in the United States army, serving one year. Having obtained the degree of M. D. from the National Medical College in Feb., 1863, he became an acting assistant surgeon in the United States army, and in March, 1864, was commissioned assistant surgeon. He served in Arizona till the fall of 1865, when he returned to Washington, and was engaged in the Smithsonian Institution in elaborating the results of his operations in the West. From June, 1866, to Oct., 1872, he was on duty at Columbia, S. C., Fort Macon, N. C., and Fort McHenry, Md. He was then transferred to Dakota, and was post surgeon at Fort Randall until May, 1873, when he became surgeon and naturalist of the Northern Boundary Commission. He spent the summer in the field and the winter in Washington in work connected with his commission, until July, 1876, when he was made secretary and naturalist of the U. S. Geological Survey of the Territories, and was employed chiefly in Wyoming and Colorado. In 1877 he was elected professor of anatomy in the National Medical College, though his connection with the Geological Survey continued without interruption till 1880.

The rare opportunities for the thorough study of natural history furnished by his position in the army and on these surveys were eagerly embraced by him, so that he has collected and preserved more specimens than any other living naturalist. His collections have always been deposited in the National Museum. In 1861 he began to publish scientific articles, and has since been a diligent contributor to medical, literary, and scientific journals, both American and foreign. Among these may be noted the London *Ibis* and the *American Naturalist*, of which he has been one of the editors. His contributions relate to ornithology, mammalogy, herpetology, and comparative anatomy, and include several hundred monographs. His principal works are—*A Key to North American Birds* (1872), *Field Ornithology* (1873), *Birds of the North-west* (1874) *Fur-bearing Animals* (1877), *Monographs of North American Rodentia* (1877), *Birds of the Colorado Valley* (1878), *Ornithological Bibliography* (1878–80), *New England Bird-Life* (1881), *Check-List and Dictionary of North American Birds* (1882), *New Key to North American Birds* (1884), etc. In another department he published *Biogen* (1884), a new theory of the basis of life, and became an active advocate of theosophy. Dr. Coues has been elected a member of the National Academy of Science and of nearly every other scientific association in the United States, and is also a corresponding member of similar European associations. He still holds the professorship of anatomy in the National Medical College, Washington, D. C.

COULANGES, Fustel de, a French historical essayist, was born in Paris in 1830. After graduating at the *École normale supérieure* of Paris, in 1853, he spent two years in the French school at Athens and was professor of history in various lyceums till 1859. He then became a member of the faculty in the University of Strasburg, where he spent ten years. He was recalled to Paris as superintendent of historical studies in the normal school. In 1879 he was made professor of history at the Sorbonne, where he has special charge of mediæval history. He is also a director of the normal school and a member of the council of public instruction. His most important work appeared in 1862 under the title *The Ancient City* (*La Cité Antique*). It is an examination of the origin and development of the religion, laws, and institutions of Greece and Rome. He maintains that the primal religion of the classical nations was simply a worship of ancestors, and that out of the family customs and religion grew the institutions of the state. The author's total silence as to the labors of other investigators in the same field gives an unpleasant impression that his object is to produce a work of art where he should aim simply at instruction and truth. The book reached its ninth edition in 1882; it was translated into English in 1874. Another contribution to the discussion of Greek antiquities is his *Essai sur la propriété foncière à Sparte* (1880). He has issued part of a work entitled *Les Institutions politiques de la France*, which brings the history down to the seventh century, and has published various essays in the *Revue des Deux Mondes* and other periodicals.

COUNCIL BLUFFS, a city of Iowa, county-seat of Pottawattamie co., near the E. bank of the Missouri River, 4 miles E. of Omaha, Neb., and 140 miles by rail W. S. W. of Des Moines. To this point converge the following railways: a division of the Chicago and North-western, the Chicago, Rock Island, and Pacific, a branch of the Chicago, Burlington, and Quincy, another of the Chicago, Milwaukee, and St. Paul, the Kansas City, St. Joseph, and Council Bluffs, a division of the Wabash, St. Louis, and Pacific, and the St. Paul, Minneapolis, and Omaha; while to the W. the great iron bridge of the Union Pacific Railroad extends to Omaha, affording passage to street cars as well as to trains. The city is mostly built on the plain which lies between the river and the steep bluffs which give name to the town; but many houses are built in the ravines which intersect the bluffs. These bluffs were in ante-territorial times a favorite place for the Indian tribes to meet in council. The city has commodious county buildings; good public schools, including a high-school, 2 national banks, a savings-bank, newspapers, a Catholic seminary and parish-schools, a State institution for deaf mutes, an opera-house, a convenient street-railway system, and is the seat of thriving manufactures of engines, machinery, farm-implements, carriages, etc., and of large mercantile interests. Council Bluffs was visited in 1804 by Lewis and Clarke, who here met the Indians in council. In 1820 land at these bluffs was ceded to the whites by the Omaha Indians. In 1846 some

Mormons here founded a town called Kanesville; and in 1853 the present city was incorporated. Population in 1870, 10,020; in 1880, 18,063.

COUNSELLOR-AT-LAW, an officer in the Supreme Court of the United States and in some of the State courts who is employed by a party in a cause to conduct the same in its trial in his behalf. He differs from an attorney in that it is his duty to draft, review, or correct special pleadings, manage the cause on the trial, and apply established principles of law to the exigencies of the case. An attorney-at-law, on the contrary, is supposed to conduct only the more mechanical parts of the cause. In New York, by a recent rule of the court of appeals, a two years' course of study is required after admission to the bar as an attorney before a person can attain the position of counsellor. See ATTORNEY. (L. L., JR.)

COUNTY. In American usage a county may be defined as the principal local subdivision of a State, created by the sovereign power for political and judicial purposes. County organization is almost exclusively designed to carry out the general governmental policy of the State at large by the formation of convenient districts to serve as bases of administration in the matters of elections, the jurisdiction of the courts, care of the poor, finance, highways, militia, education, and the like. Established without the direct consent or solicitation of the inhabitants of the locality, counties differ in this respect from municipal corporations proper, which are created mainly for the advantage and profit of the citizens and at their particular request. Although all of the States are divided into counties, or districts equivalent thereto, and these all bear a close resemblance in many of the powers with which they are vested by the State, yet the number and the importance of the governmental functions exercised by these public or quasi corporations vary greatly according to the influence upon the particular State of one or the other of two widely different systems of civil government introduced and developed in the original colonies from the time of the English settlement.

See Vol. VI. p. 455 Am. ed. (p. 512 Stim. ed.).

In the South, the colonies being planted chiefly in the interest of the proprietaries, and the mass of the settlers being both incapable and careless of direct participation in public affairs, the plans of government and methods of administration familiar in England were naturally imported to the new country. Accordingly, so soon as the expansion of the colony necessitated subdivision of territory to facilitate the execution of the laws and the collection of revenue throughout a widely-scattered agricultural population, the county system of England was imposed with little change by the general government. Thus in Virginia, Maryland, the Carolinas, Georgia, Delaware, and even Pennsylvania, the administration of law by means of county organization is apparent almost from the beginning, and the system thus inaugurated has been extended with certain modifications to the greater number of the subsequently established States. Under this pure county system nearly all the functions of government are exercised by county officials, elected by the county at large and acting strictly under the statute law of the State.

At the settlement of New England the nature of the country combined with the peculiar qualities of Puritan character and e[illegible]al polity to bring about a con[illegible] in c[illegible]-settled communities, and gave a pr[illegible] [illegible] to the town as the basis of civil [illegible] of counties became the instruments for the local administration of public affairs, and each individual freeman influenced government by his presence and vote at the town-meeting. Subsequently, when it was deemed expedient to conform to the method of territorial division prevailing in the other States, counties were created throughout New England, not by the extinction of the powers of the towns, but by the voluntary surrender to the county organizations of a portion of their prerogatives. Hence the counties of the New England States are mere congeries of towns, formed mainly with the view of defining more conveniently the jurisdiction of the courts and of caring for certain public property, the older municipalities still retaining the greater number of their functions in the machinery of government. In the States largely influenced by emigration from New England, such as New York, Ohio, Illinois, Indiana, Michigan, Wisconsin, and Iowa, is seen a combination of these two systems, by which, although larger powers have been conferred upon the counties, a direct influence of the towns in county affairs is carefully maintained by the appointment of boards of county officers, whose members are representatives elected by the various townships instead of by the county at large.

In the States established since the adoption of the Federal Constitution a tolerably uniform plan of creating new counties has prevailed. The fundamental or enabling act of Congress by which a portion of the national domain is converted into a Territory of the Union has usually conceded to the Territorial legislature then constructed the right, either express or implied, to parcel off the land into counties or districts. Upon admission to the Union the constitutions of most States have recognized the county division already made, provided (within certain limits as to area and population) for further subdivision, and have laid down certain restrictions in regard to the extent of Congressional districts, the change and establishment of county towns, etc.

The details of county organization, the powers to be exercised, the names, duties, and mode of election of the county officers, are defined by acts of the legislature, and vary somewhat in the different States.

The usual *powers* of a county considered as a body corporate are the right to sue and be sued, to purchase, hold, and convey real estate and other property, to make contracts in relation to the property and concerns of the county, and to administer through various officers and agents the governmental machinery of the State in relation to the election of national and State officials, the administration of justice, the levying and collection of the State and local taxes, the development and care of the highways, and the fostering of the material resources of the State (hence the frequent authority given by law to counties to subscribe for stock in railroads and other enterprises directly benefiting the community), the care and oversight of the poor and infirm, the education of the people in common schools. In many States quasi corporations distinct from the counties have been established to exercise some of the powers above enumerated, such as school districts, road districts, etc. As a consequence of the public nature of these functions, counties may take property by the right of eminent domain, and it has been held by many courts that they are not liable to pay out of the public treasury damages caused by the fault or negligence of their officers and agents. They may borrow money, and secure the repayment of the same by issuing bonds.

The names of *county officers* and the apportionment

of their duties differ considerably in the several States. Generally, a board of three or more persons, variously termed county *commissioners* or *supervisors*, exercises the widest authority in the county. They construct and care for the public buildings, jails, court-houses, and other properties, audit the accounts and receive the reports of the other officers, apportion and direct the levying of taxes, arrange the election precincts and provide for the convenient holding of elections, lay out roads, provide for suitable accommodations for the sick and poor, authorize contracts and loans. In the more populous localities many of these duties are apportioned to other individuals or bodies—overseers of the poor, building commissions, boards of health, road commissioners, auditors, etc. The county clerk—sometimes called the recorder of deeds—is the custodian of public and private documents of value, and often acts as the secretary of the board of commissioners. The sheriff has the custody of all prisoners, executes the process of the courts, and acts as a peace officer in suppressing disorder or riot. The coroner acts for the sheriff in his absence, and is charged with the investigation of all cases of sudden death. The county treasurer receives and disburses the moneys of the county. The county surveyor is appointed to make both public and private surveys, and is directed to keep plats both of the county and of the towns within its area. A school superintendent or board of school directors, having the conduct of the public schools, are sometimes county officers. Assessors are frequently elected to make enumeration both of the taxable property and of the qualified voters.

Connected with the administration of justice are the county judges, having jurisdiction in courts of first instance within the county limits; probate officers, called by different names—registers of wills, surrogates, probate judges, etc.; prosecuting or district attorneys, representing the commonwealth in criminal proceedings; and clerks or prothonotaries of the courts.

The word "county" is not of uniform occurrence in designating these principal divisions of a State. In Louisiana districts exercising the functions of counties are termed parishes. This was also the case at first in Georgia, and until quite recently the present counties of South Carolina were known as election districts. (J. R. P.)

The subdivisions of counties vary in the different States of the Union. In New England, as stated above, counties are mere aggregations of towns, and cities are in effect towns with somewhat different government, though in Connecticut some cities and boroughs are constituent parts of the towns in which they are situated. In the sparsely-settled parts of Maine there are divisions called "plantations" and "gores," while the name "township" indicates a tract of land without organization. The name "gore" is also used in Vermont. In New York counties are divided into towns, but cities are independent of the towns from which they are taken, while incorporated villages remain component parts of the towns. In fifteen States the name "township" is properly used for the principal subdivision of a county, though in some "town" is also in popular use. There is much difference as to the independence of municipal corporations. In New Jersey and Michigan cities are independent of the township; in Pennsylvania and Minnesota, cities and boroughs; in Kansas, all cities of the first and second classes—that is, all having over 2000 inhabitants; and in Wisconsin there is no uniform rule, but most cities and some villages are independent. In Ohio, Indiana, Iowa, Arkansas, North and South Carolina, cities are subject to township government, though a large city is generally made coextensive with a township. In Missouri the same rule holds, but by an exception St. Louis has an independent organization. In California the subdivisions of the county are called "judicial townships." In Illinois most of the counties are divided into townships, but twenty-three are divided into precincts. The latter mode of division is used in all the Territories except Dakota, and has been continued in some States after their admission to the Union; these are Florida, Nebraska, Nevada, Colorado, and Oregon; it is also used in one of the thirteen original States—Maryland. In Delaware the old English name "hundred" is retained for the subdivision of a county. In some of the Southern States counties are divided into districts; these are called "magisterial districts" in Virginia, West Virginia, and Kentucky, "civil districts" in Tennessee, and "militia districts" in Georgia. In Alabama and Mississippi the county subdivisions are called "beats." In Louisiana each parish is divided into police-jury wards. Texas has a more complicated system of division than any other State: each county is divided into four commissioners' precincts, then into a larger number of justices' precincts, and finally into a still larger number of election precincts. In all the Southern and Western States, except as specified above, municipal corporations are a component part of the county division in which they are situated. Cities, however, are usually made coextensive with one or more of these divisions. In Maryland the city of Baltimore is independent of Baltimore county; in Louisiana the city of New Orleans is coextensive with Orleans parish; and in California, San Francisco city and county are coextensive. Philadelphia city is coextensive since 1854 with the county of Philadelphia, embracing nearly one hundred and thirty square miles of territory, but is divided into civic, suburban, and rural districts for purposes of taxation, etc. Throughout the United States the place selected for the transaction of the public business of each county is commonly called the county-seat, sometimes the county-town.

COURLAN, a wading bird, related both to cranes and to rails, type of the family *Aramidæ*, which has but a single genus, *Aramus*, of one or two species, native of the warmer parts of America. The North American Courlan, Caran, limpkin or crying-bird (*A. scolopaceus giganteus*) inhabits the marshes of Florida, the West Indies, etc. It is upwards of 2 feet long, the wing 12 or 14 inches, the tail 6 or 7, the bill and tarsus, each, about 5. The bill is about twice as long as the head, nearly straight, but contracted opposite the nostrils and with enlarged and decurved terminal portion; the nostrils are long, linear, and pervious; the toes are cleft, the hinder one elevated; the tail consists of 12 broad feathers; the wings are short and rounded. The color is chocolate-brown with a slight olive gloss, extensively and sharply streaked with white. The South American bird is very similar, but less extensively streaked, chiefly on the head and neck. In their general habits and economy the Courlans closely resemble Rails (*Rallidæ*), living in large numbers in reedy marshes, threading their way with great ease and celerity through the mazes of the swaying vegetation, upon the most uncertain footing, but their flight is usually low, slow, and apparently labored. In the breeding season the reeds resound with their loud cackling notes. The nesting is like that of rails, a shallow, bulky platform of broken-down reeds being constructed by the water's edge; the eggs are said to be 5 or 6 in number. (E. C.)

COURT.

IN this article are considered only the courts or judicial tribunals of this country, which are treated under the following heads: I. Courts of the United States. II. State Courts. III. Courts of Admiralty. IV. Courts-Martial.

See Vol. VI. p. 458 Am. ed. (p. 516 Edin. ed.)

CHAPTER I.

Courts of the United States.

In glancing over the field of jurisprudence in this country, we are first struck with the fact that the system of administering justice follows the political divisions of the land; that each State has its own complete, distinct, independent system of courts, superior and inferior. Nor is it less apparent that all these systems, save that of Louisiana, of French origin, spring from a common source in the mother country. The principles of common law and equity, and, generally speaking, the methods of practice, familiar to the English courts, will be found firmly rooted in those of America, none the less because of variations in matters of form incident to altered social and political relations. The English law reports will be heard frequently on the lips of the advocate, though cited as learned expositions of recognized doctrines, not as having the binding force accorded in the courts of each State to the decisions of its own highest tribunal. Looking further, we find established in every State certain courts belonging to a distinct system, at whose head stands the Supreme Court of the land. These are the United States Circuit and District Courts, which deal for the most part with a different class of cases from the State tribunals, and appropriate to national control, and yet whose decrees often operate upon the same community and property as the latter, requiring great care to prevent, at all times, clashing of authority. Our attention will now be occupied with the Federal system, afterwards with that of the States. This system is peculiar, nay, it must be confessed, complicated and artificial; and it is only by reflecting upon the circumstances which gave birth to it and the political structure for which it is adapted that we can fairly appreciate its merits. It must be remembered that our system of government is composed of elements not in themselves harmonious: a central power clothed at first sight with sovereignty coextensive with the nation, and a collection of independent commonwealths, each with its own governor, legislature, and judiciary, and jealous of any infringement of local authority. That these antagonistic elements have been combined with so large a measure of success is due to the wise distribution of powers characteristic of the American government, which has been aptly described by Judge Cooley as "an elaborate system of checks and balances."

To obtain an idea of the organization of the Federal judiciary and the subjects within its scope, let us look at the provisions of the Constitution relating thereto, and under the authority derived from which it has been constructed:

> The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges both of the Supreme and inferior Courts shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office. (Art. III., Sec. 1.)
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> The judicial power shall extend to all cases in law and equity arising under the Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to those between two or more States; between a State and citizens of another State; between citizens of different States; between citizens of the same State claiming lands under grants of different States, and between a State or the citizens thereof and foreign States, citizens, or subjects. In all cases affecting ambassadors, other public ministers and consuls, and those in which a State shall be a party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as Congress shall make.
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> The trial of all crimes, except in cases of impeachment shall be by jury; and such trial shall be held in the State where the said crime shall have been committed; but when not committed within any State, the trial shall be at such place or places as Congress may by law have directed. (Art. III., Sec. 2.)
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> The judicial power of the United States shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign State. (11th Amendment.)

In analyzing briefly these provisions we begin with Sec. 2. The terms "cases in law and equity" and "of admiralty and maritime jurisdiction" are here used, as they are throughout the State courts, according to the jurisprudence of England. Not that there is a common law of the United States, but the Constitution adopts the common law, in the general sense of the term, so far as to make it a guide in the administration of justice. Thus an indictment cannot be sustained in the courts of the United States, unless the offence complained of has been declared a statutory crime; but jurisdiction once given by statute, the principles of the common law are involved at every step of procedure. So the distinction between law and equity is recognized; and although Congress has vested equitable and common law powers in the same tribunals, yet they are administered as distinct systems, and even where the reformed code of procedure of a State declares the distinction between law and equity abolished, substituting but one form of civil action, yet a complainant, resorting to a Federal court, must proceed at law or in equity, as the case may be. Further examination shows that the various cases comprised by the Constitution within the judicial power of the United States may be divided into three classes: (1,) those of a political character, where the controversy turns on the Constitution, or laws or treaties of the government; (2.) those cases involving the exercise of jurisdiction over certain classes of persons or bodies politic, as ambassadors, etc., the United States itself, the several States or citizens thereof, or aliens; (3.) those depending upon the subject-matter, as admiralty and maritime cases. A very moderate acquaintance with the requirements of our political system is sufficient to demonstrate the wisdom of giving the Federal courts jurisdiction in these cases. But this jurisdiction is not always exclusive. In some cases it is concurrent with that of the State courts; in others it is limited so as to exclude controversies involving comparatively small amounts; and in others the defendant has the privilege of removing the cause from the State to the national tribunal. (See *Removal of Causes*, under Appeal, vol. i. p. 263.)

The section, providing for the trial of all crimes, except in cases of impeachment, by jury, and in the State where the crime shall have been committed, plays an important part in preventing a clashing between the State and United States courts. To enforce this provision it was enacted that the Judiciary Act of 1789, by which the organization of the Federal system of courts was commenced, directs (sec. 14) that writs of *habeas corpus* should in no case extend to prisoners in jail, except when in custody under the authority of the United

States, or committed for trial before some court of the same, or when it is necessary they should be brought into court to testify. Other exceptions need not be here enumerated. This restriction leaves to each State the exclusive administration of its own laws in all cases of imprisonment, and has always been scrupulously observed. The Judiciary Act just referred to also enacts (sec. 34) that the laws of the several States, except where the Constitution, treaties, or statutes of the United States otherwise require, are to be regarded as rules of decision in trials at common law, in the courts of the United States, in cases where they apply; and the practice, pleadings, and forms and mode of proceeding in common law causes in the circuit and district courts are required to conform, as near as may be, to those existing at the time in like causes in the courts of record of the State within which such circuit or district courts are held. (U. S. Revised Statutes, § 914.) Hence, in adjudicating upon rights and property in a State, they will follow usually the latest decisions of the highest tribunal of that State, but a change of decision by a State court in the construction of a statute will not affect rights acquired under the former decision, and the Federal courts will not follow the decision of an inferior court. Nor are the decisions of the State courts binding on questions of general commercial law, nor of the principles of equity jurisprudence. The adjudications of legal principles by the United States Courts are then, as compared with those of the States, either of paramount, equal, or inferior authority. *Paramount*, upon all subjects relating to the political organization of the general government, its laws and treaties, and commercial relations. This, of course, applies chiefly to the Supreme Court; in a much less degree to the Circuit Courts. *Equal*, upon questions of general commercial law, and other questions depending upon general principles, *i.e.*, of equal or not greatly superior weight in the courts of any State with the decisions of the supreme court of another State. *Inferior*, in cases where the United States courts administer the laws of particular States or construe their constitutions, in virtue of jurisdiction growing out of the character of the parties.

We are now ready to consider separately the courts composing the judicial system of the United States, and will do so in the following order: 1, the Supreme Court; 2, the Circuit Courts; 3, the District Courts; 4, the Territorial Courts; 5, the Supreme Court of the District of Columbia; 6, the Court of Claims; 7, the Senate of the United States as a Court of Impeachment.

1. *The Supreme Court* is established directly by the Constitution, without the intervention of Congress, and its vast importance as one of the three co-ordinate departments of the Federal government has been often displayed on important occasions and much dwelt upon by constitutional writers. It consists of a chief-justice, and 8 associate justices. The latter have precedence according to the dates of their commissions, or, where two or more have the same date, according to their ages. The court holds annually one session at the seat of government, commencing on the second Monday in October, and such special terms as it may find necessary. It adopted at an early day the practice of the Court of King's Bench as its guide, subject to such alterations as circumstances might suggest. No State legislation can be applied to the practice of this court, which is regulated only by the common law and acts of Congress. Its jurisdiction is either original or appellate, civil or criminal. It has exclusive jurisdiction of all controversies of a civil nature where a State is a party, except between a State and its citizens, or between a State and citizens of other States, or aliens, where its jurisdiction is original, but not exclusive; of suits or proceedings against ambassadors or other public ministers, or their domestics, so far as may be consistent with the law of nations; and original, but not exclusive, jurisdiction of all suits brought by ambassadors, or other public ministers, or in which a consul or vice-consul is a party. It has power to issue writs of prohibition to the district courts, when proceeding as courts of admiralty; and writs of *mandamus*, in certain cases warranted by the usages of law; also writs of habeas corpus, *scire facias*, and all other writs necessary for the exercise of its jurisdiction, and agreeable to the usages of law. The justices have also, individually, the power to grant writs of *habeas corpus*, of *ne exeat*, and of injunction. Congress can only vest in the Supreme Court original jurisdiction in cases where the Constitution has clearly given that court original jurisdiction.

The appellate powers of the Supreme Court, which are more fully treated of under APPEAL, extend as well to the courts of last resort of the several States as to the inferior Federal tribunals. Its *criminal* jurisdiction is very limited and has been rarely exercised. It is derived from its exclusive jurisdiction of proceedings against ambassadors, etc., mentioned above. But the act of April 30, 1790, declared void any writ or process for the arrest or imprisonment of any ambassador, etc., or the servants of the same.

2. *The Circuit Courts* are the chief inferior courts established by Congress. It was originally intended that one or more of them should be held annually in each State, by one of the justices of the Supreme Court, together with the judge of the District Court for that district. But the increase in the number of States called for an enlarged system and led to the present organization: the United States is divided into nine circuits, composed respectively of the following districts: *First Circuit*, of the districts of Maine, New Hampshire, Massachusetts, and Rhode Island; *Second*, Vermont, Connecticut, and New York; *Third*, Pennsylvania, New Jersey, and Delaware; *Fourth*, Maryland, Virginia, West Virginia, North Carolina, and South Carolina; *Fifth*, Georgia, Alabama, Mississippi, Florida, Louisiana, and Texas; *Sixth*, Ohio, Michigan, Kentucky, and Tennessee; *Seventh*, Illinois, Indiana, and Wisconsin; *Eighth*, Nebraska, Minnesota, Iowa, Missouri, Kansas, Arkansas, and Colorado; *Ninth*, California, Oregon, and Nevada. Circuit Courts are now established as follows: one for the three districts of Alabama; one for the eastern district of Arkansas; one for the eastern district of Mississippi; and one for each district in the other States. (Revised Statutes, § 608.)

The Circuit Court is now composed of one of the justices of the Supreme Court, who is required to attend at least one term every two years; a circuit judge who must reside in his own circuit, and having the same powers therein as the circuit justice, and the district judge of the district where the circuit is holden. But Circuit Courts may be held by the circuit justice, or the circuit judge, or the district judge, or any two of them, and Circuit Courts may be held at the same time in the different districts of the same circuit.

The judges of the Supreme Court have no distinct commission as Circuit Court judges, but as long ago as

1803 their authority to so act was held established by long acquiescence. The ministerial officer of the Circuit Courts, corresponding with the sheriff of a County Court, and whose duty it is to execute the process of the court, is called the United States Marshal. A class of officers known as United States Commissioners also play an important part in the administration of the business of the Circuit and District Courts. They are appointed by the Circuit Court, from among members of the bar, as many as may be necessary in the different parts of the district, and are authorized to take preliminary examinations of persons charged with offences against the United States laws, and commit them for trial; also of persons claimed for extradition; to hold to bail to keep the peace, and for good behavior; to discharge indigent convicts imprisoned for non-payment of fines to the United States, and to perform various other duties.

The Jurisdiction of the Circuit Court is either civil (at law or in equity) or criminal, and original or appellate. The original jurisdiction has been much enlarged by the act of 3d of March, 1875, which seems also by inference to have extended the concurrent jurisdiction of the State courts to many cases under the laws of the United States, which were formerly subject only to Federal jurisdiction. It provides that the Circuit Courts shall have original cognizance, concurrent with the courts of the several States, of all suits of a civil nature at common law or in equity, when the matter in dispute exceeds, exclusive of costs, $500 in value, and arising under the Constitution or laws of the United States, or treaties made under their authority, or in which the United States are plaintiffs or petitioners, or in which there shall be a controversy between citizens of different States or between citizens of the same State claiming lands under grants of different States, or between citizens of a State and foreign States, citizens or subjects, and a corporation is a citizen of the State which created it; and shall have *exclusive* cognizance of all crimes and offences cognizable under the authority of the United States, except as otherwise provided, and *concurrent* jurisdiction with the District Courts of the crimes and offences cognizable therein. But no person shall be arrested in one district for trial in another in any civil action before a Circuit or District Court. And no civil suit, except under certain specified circumstances, shall be brought by either of said courts against any person by original process in any other district than that whereof he is an inhabitant, or in which he shall be at the time of serving such process. The Circuit Court has also jurisdiction in cases arising under the revenue laws, and of a variety of other matters, which need not here be further set forth. The appellate jurisdiction of the Circuit Courts is limited to affirming, modifying, or reversing the judgments, decrees, and orders of the District Courts. (See APPEAL.)

3. *District Court.*—We have already referred to the division of the States into districts. Most of the States have but one district, but many have two, and Alabama, New York, Tennessee, and Texas, three each, known respectively, according to their situation, as the northern, southern, middle, etc., districts. They now number in all sixty. Congress has provided for the appointment of a judge for each district, with some exceptions where one judge presides over all the districts of a State. Each judge must reside within his own district. The District Court has the largest original jurisdiction of any of the Federal Courts, standing in a similar relation to the Circuit and Supreme Court as do the County Courts of a State to its Supreme Court. It is the court of admiralty and bankruptcy, but since the repeal of the bankruptcy laws, Sept. 1, 1878, that part of its jurisdiction is unimportant. Of course also the office of Register in Bankruptcy was thereby abolished except so far as to allow of the settlement of proceedings begun before the repeal went into effect. One or more registers whose duties were to assist the District Court in the administration of bankrupt estates were appointed for each Congressional district by the district judge.

The further jurisdiction of the District Court is as follows: Crimes cognizable by the United States not capital; piracy, when no Circuit Court is held in that district; penalties and forfeitures under the United States laws; suits at common law by the United States or their officers; suits in equity to enforce liens on land for internal revenue taxes; forfeitures or damages under laws relative to debts due by or to the United States; all actions under the postal laws; exclusive jurisdiction of seizures on land and waters not within admiralty jurisdiction; of all prizes, except where the Circuit Court has jurisdiction; all suits for the condemnation of property, taken as prize, which has been in any way used for the promotion of insurrection; all suits upon assignments of debentures for drawbacks of duties; suits growing out of the infringement of the civil rights laws; suits at law or in equity for infringements of rights secured by the Constitution or laws of the United States; certain suits to recover possession of an office where the sole question touching the title thereto arises out of the denial of the right of a citizen to vote on account of race, color, or previous condition of servitude; certain proceedings by *quo warranto*, for the removal of any person from office, except a member of Congress or of a State Legislature; suits by or against national banks; by aliens for torts contrary to the law of nations, or to a treaty of the United States; suits against consuls and vice-consuls, except for certain offences.

4. *Territorial Courts.*—The Constitution vests in Congress the right to dispose of and make all needful rules and regulations concerning the territory of the United States. The courts of the Territories, therefore, derive all their powers from acts of Congress, and recognize no distinction between Federal and State jurisdictions. A substantially uniform judicial system has been established in all the Territories, consisting of a Supreme Court, District, and Probate Courts, and Justices of the Peace. In Arizona the system of courts, except the Supreme Court, was provided by the legislative council of the Territory, but is like that of the other Territories. The Supreme Court is composed of a chief-justice and two associate justices, appointed for four years, and holding an annual term at the capital of the Territory. Each of these justices holds a District Court in one of the three districts into which every Territory is divided, at a time and place prescribed by law, and they are also authorized to hold court within their respective districts, in the counties wherein courts have been established to hear causes in which the United States are not a party. The Supreme and District Courts possess original and appellate, common law, and chancery, jurisdiction. The original powers of the Supreme Court extend to the issuance of all writs necessary to the exercise of its appellate jurisdiction. As a court of appeal, it re-

views the final judgments of the District Courts. The latter have the same original jurisdiction over all cases arising under the Constitution and laws of the United States as the Circuit and District Courts of the United States. Their jurisdiction extends to all actions at law where the demand exceeds $100 in value (but in Montana this limit is $50; in Utah, $300; and in New Mexico there is no such limit); also to all suits in equity, and to the more important criminal cases. Appeals lie to them from the Probate and Justices' Courts. The Probate Courts perform the usual functions of such courts in the several States, but in some of the Territories, as in Idaho and Montana, they have a concurrent jurisdiction, in certain criminal matters, with the Justices' Courts, and a general civil jurisdiction where the amount involved does not exceed $500. The Justices' Courts have a limited civil and criminal jurisdiction, resembling the same tribunals in the States, and are open at all times. Upon the change of a Territory into a State, Congress may provide for the transfer of all pending causes to the United States Courts, with authority to dispose of them finally. In all the Territories but Washington (where the limit is $2000), an appeal will lie from the Supreme Court to the Supreme Court of the United States, where the value in dispute exceeds $1000. A marshal and district attorney are appointed for each Territory, for a term of four years.

5. *The Supreme Court of the District of Columbia* was established by act of Congress of 3d March, 1863, absorbing the functions of the Circuit, District, and Criminal Courts of the district theretofore existing. It consists of a chief-justice and five associates, appointed by the President. Its jurisdiction is general in law and equity, original only in cases involving over $50, including patent, copyright, bankruptcy, and divorce cases, appeals from the decisions of the Commissioner of Patents refusing the issue of a patent, and appeals from the Police Court and from justices of the peace, who have chiefly a civil jurisdiction. The organization of the court comprises a District Court of the United States, a Circuit Court for the trial of actions at law, and special terms respectively as a court of equity, or for probate or criminal business. Any one of the justices may hold a District, Circuit, or Criminal Court. Owing to its situation at the seat of government this court is clothed with certain important powers peculiar to itself, especially that of issuing a writ of *mandamus* to any of the heads of the executive department. Actions can only be brought against inhabitants of the district or persons found therein.

6. *The Court of Claims* is one of the inferior courts constituted by Congress with jurisdiction of contracts between the government and the citizens. Before its establishment, claims could only be brought to the consideration of the government by presenting them in Congress, and it was established, according to Chief-Justice Chase, "in 1855 for the triple purpose of relieving Congress, of protecting the government by regular investigation, and of benefiting the claimants by affording them a certain mode of examining and adjudicating upon their claims." Its powers were at first very limited, as it could only report to Congress a bill authorizing payment of claims favorably passed upon, but they have been much enlarged and modified by various subsequent enactments, and its judgments, unless appealed from, are payable directly from the treasury. The Court of Claims consisted originally of three judges; now of a chief-justice and four associates, appointed by the President. Three make a quorum, but three must concur in any decision. One session is held each year, commencing at the opening of Congress, the first Monday of December. Its jurisdiction extends throughout the United States, and is confined to strictly legal claims, founded on breach of contract, as it has no jurisdiction in equity, nor of demands grounded in tort, and can only render judgment for a money demand. More in detail, its jurisdiction embraces: all claims founded upon any law of Congress, or upon any contract, express or implied, with the government of the United States, and all claims referred to it by Congress; all set-offs, claims for damages, or other demands whatsoever, on the part of the United States against any person making claim against the government in said court; all claims under the act to provide for the collection of property abandoned in the insurrectionary districts during the civil war; but the jurisdiction of the Court of Claims does not extend to claims against the United States growing out of the destruction or appropriation of any property by the army or navy engaged in suppressing the rebellion. An appeal lies from the Court of Claims to the Supreme Court of the United States.

7. *The Senate of the United States as a Court of Impeachment.*—This august tribunal is only convened on extraordinary occasions, and as it can scarcely be said strictly to belong to our judicial system will require very brief notice. The Constitution gives the Senate the sole power of trying impeachments of the President, Vice-President, and all civil officers of the United States, for treason, bribery, or other high crimes and misdemeanors, leaving it in each case to the Senate, sitting as a court, to define these terms. When organized to try an impeachment, the members are on oath or affirmation. If the President is on trial, the chief-justice shall preside; in all other cases, a quorum of senators is sufficient. Two-thirds of the members present are necessary to conviction. Judgment does not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted is nevertheless liable and subject to indictment according to law. The power of impeachment has been very rarely exercised. The chief instances are the trials of Judges Chase, in 1804, Peck, in 1831, and Humphreys in 1862, and the unsuccessful impeachment of President Johnson in 1866.

CHAPTER II.

State Courts.

Although the forensic systems of the several States, excepting those of Louisiana and Texas, which are partly derived from the civil law, have a common English origin, yet there are considerable diversities in matters of detail, as well in the methods of legal procedure as in the constitution of, and the titles assigned to, the courts. We shall first present an outline embracing the points generally common to all, and then call attention somewhat more minutely to the prominent features peculiar to each.

At the head of the tribunals of each State is a court of last resort, usually called the Supreme Court, but in some cases the Court of Appeals, always of appellate, sometimes also of limited original jurisdiction, which reviews the decisions of the circuit and county courts of the State, and possesses large powers in the issuing of remedial writs, such as *writs of error*.

supersedeas, *certiorari*, *prohibition*, *habeas corpus*, and *quo warranto*. It is composed of a chief-justice and several associates, two, four, or six, as the case may be, and usually holds its terms at regular intervals, in rotation at the principal centres of the State, but sometimes permanently at one place. Its members receive a larger salary than those of the inferior courts, and hold office for a longer term, in some cases during good behavior. The judges of the Supreme Court separately hold Circuit Courts, in many of the States, at the county-seats or in certain districts, at stated times, exercising a general civil and criminal jurisdiction, often concurrent with the county and probate courts, with power to hold jury trials and entertain appeals from justices of the peace. Courts of Chancery have a distinct existence in but a few States, their peculiar equity jurisdiction being commonly vested in certain of the common law courts. The independent system of each county comprises one or more courts of first instance, known as the Court of Common Pleas, County Court, or Circuit Court for the county (just mentioned), which have a general civil jurisdiction, in some cases also criminal, and are courts of appeal from the justices' courts; a court for the management of the estates of deceased persons, the care of children and lunatics, and of general probate jurisdiction, entitled the Probate, or Orphans', Court; criminal courts for the trial of crimes and misdemeanors, known variously as the Criminal Court, Quarter Sessions, Oyer and Terminer, Police Court, or Oyer and Terminer and General Jail Delivery; and Justices' Courts, presided over by Justices of the Peace, Magistrates, or Aldermen, clothed with authority to try suits of limited amount, usually $100, and to commit persons for trial for offences of all kinds. In some of the larger cities, additional local courts have been established, known as city, corporation, or superior courts, generally having a concurrent jurisdiction with the circuit, county, or criminal courts, or justices of the peace.

Attached to the courts of each county are certain important officials: Recorder or Register of Deeds, in whose office are recorded deeds, mortgages, and other instruments; Clerk of the County Court, whose duty it is to affix the seal of the court to all writs, processes and exemplifications, to sign judgments, and generally manage the business of the court office, and take charge of the records of the court. In some States he performs also the duties of a Recorder of Deeds. In Pennsylvania his title is Prothonotary. In many counties each court has in addition a clerk of its own. There are also clerks of corresponding functions for the court of probate, the criminal court, and the supreme court. The District or Prosecuting Attorney (in each county) conducts all criminal prosecutions on behalf of the Commonwealth; Register of Wills, in whose office wills are proved and registered, except where these duties are discharged by the Probate Court. Certain other officers who control a variety of important matters, such as Overseers of the Poor and County Commissioners, have no connection with the administration of justice, and do not require mention here. The machinery for enforcing the process of the courts essentially conforms throughout the land to the original English type, and the sheriff and coroner continue to play the roles so familiar to the people in Shakespeare's day. Allusion has been made to the peculiar origin of much of the jurisprudence of Louisiana and Texas. Notwithstanding that fact, those States may fairly be included in the foregoing sketch. The laws of Louisiana affecting public and personal rights, and criminal and commercial matters, have been assimilated to those of the other States, but in relation to real property, the common law or English equity system has never been adopted there. In Texas the forms of pleading and practice derived from the civil law, introduced by the Spanish settlers, obtain, but modified by the common law. In both States the peculiarities are rather internal, affecting the law itself, than apparent in the outward organization of the courts.

A consideration of the jurisprudence of the country would be very imperfect without some reference to the adoption of codes, under which the legal procedure of most of the States and Territories is now conducted. (See CODE.)

The following is a brief statement of the titles and jurisdiction of the courts in the several States.

Supreme Court.—This title is given to the court of last resort in nearly all the States. In Connecticut it is called the Supreme Court of Errors; in Delaware and New Jersey, the Court of Errors and Appeals; in Maine and Massachusetts, the Supreme Judicial Court; in Maryland and New York, the Court of Appeals, but in the latter State there is also a Supreme Court, only inferior to the Court of Appeals, and composed, to meet the vast requirements of the State, of thirty-four members, apportioned among eight districts, four to each district, except those of New York city and Brooklyn, which have five each. In Texas the Supreme Court has appellate jurisdiction only in civil cases from the District Courts, and the Court of Appeal hears appeals in all criminal cases, and in civil cases from the county courts. What most nearly corresponds to a court of last resort is The Commissioners of Appeals, created in 1879, to which cases are referred by consent of parties. In Virginia and West Virginia the highest tribunal is the Supreme Court of Appeal.

Chancery Court.—This is found now only in Alabama, Arkansas (Pulaski co. only), Delaware, where it consists of a Chancellor; in six counties of Kentucky, Mississippi (the State is divided into twelve districts, each with a Chancellor); New Jersey, and Tennessee; *formerly* also in New York and South Carolina. An appeal lies in most of these States from Chancery to the court of last resort. It must not be forgotten that the principles of Chancery have been adopted in all the States (except in Louisiana as to real estate), though their application has been much modified. In many of the States Chancery powers are exercised by the common law judges, but according to the practice of Chancery. Of this class are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, Pennsylvania, Virginia, West Virginia, North Carolina, Georgia, Illinois, Texas, Florida, Michigan, Iowa, Arkansas, and Oregon. In the States not included in either of these groups, the distinction between actions at law and suits in equity has been abolished, as before referred to in speaking of the State codes; but yet it has been found necessary to provide for certain equitable remedies, such as injunction and specific performance, and other methods borrowed from Chancery are employed under the forms known to the common law or established by statute.

The singular mingling of law and equity in the practice of Pennsylvania calls for special notice. Equity is part of the common law of that State. The want of a court with chancery powers early led to the courts administering equity through common law forms. Thus the action of assumpsit was made to

supply the place of a bill in equity, and its sufficiency as a remedy has almost entirely withdrawn parol contracts from chancery jurisdiction. A *cestui que trust* has been permitted to maintain ejectment in his own name for property of which he was entitled to the possession. The owner of a lost bond could not at law maintain an action thereupon, because he could not make *profert* of it. But in Pennsylvania he was allowed to make his declaration, merely stating his reasons for not producing the bond. So every kind of equitable right is subject to the lien of a judgment, and may be completely sold under an execution; examples need not be multiplied. This unique development in jurisprudence does not interfere with the administration of equity through the regular chancery forms, which, we have already seen, exist now in Pennsylvania. (See CHANCERY.)

Circuit Courts.—These are held in Alabama, Arkansas, Colorado, Florida, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, Oregon, Tennessee, Virginia, West Virginia, and Wisconsin. California, Maine, and Pennsylvania have no such courts nor anything quite corresponding thereto, but in the other States their place is supplied by circuits of the Superior or District Courts, or Court of Appeals.

Probate Courts.—Courts of general probate jurisdiction, *i. e.*, for taking proof of wills, issuing letters testamentary, of administration and of guardianship, etc., are known by this title in Alabama, Arkansas, Connecticut, Illinois (in counties of over 70,000 population), Kansas, Maine, Massachusetts, Michigan, Minnesota, Mississippi, New Hampshire, North Carolina, Ohio, Rhode Island, South Carolina, Tennessee, and Vermont. In the following States it is the Orphans' Court: Delaware, Maryland, New Jersey, and Pennsylvania. In Georgia it is designated the Court of Ordinary, and in some of the larger counties of New York, as New York and Kings, the Surrogate's Court. In the other States the powers of the Probate Court are delegated, usually to the Civil Courts of each county, but sometimes to the Circuit Courts or the Court of Chancery.

Courts of Common Pleas exist in some counties of Connecticut, the city and county of New York, in Kentucky, Pennsylvania, Rhode Island, and South Carolina, but equivalent functions are performed in all other States by the County, City, Circuit, or District Courts.

City or Municipal Courts.—The jurisdiction of these courts, as the name implies, is purely local and is often both civil and criminal. They are established in the chief cities of Connecticut, in some cities of Maine, in the cities of Boston, New York, Baltimore, St. Louis, New Orleans, Montgomery, and Mobile, Ala., and in cities of over 6000 inhabitants in Indiana. The Marine Court of the city of New York, originally established to determine controversies involving seamen arriving at that port, but now of more general, though purely local, jurisdiction, is one of the oldest examples of this class. The Supreme Bench of Baltimore is a peculiarly constituted tribunal, composed of the Superior, the Common Pleas, the Circuit, the Criminal, and the City Courts of Baltimore, with power to make all needful rules and regulations for the conduct of business in each of the courts of that city.

Justices' Courts are found in every State but Virginia, where, for every city of 5,000 inhabitants or upwards, they have a *hustings'* or corporation judge. In some places Justices' Courts have been superseded by Police Courts. (A. L.)

CHAPTER III.

COURTS OF ADMIRALTY.

Courts of Admiralty had been established in all the provinces of British North America before the Revolutionary war. In some cases these courts were created by charter, in others they were established by acts of the provincial legislature, but usually Admiralty jurisdiction was conferred, directly or indirectly, by royal commissions, which were of four kinds: (1.) A commission to the Governor, as such; (2.) A general commission to the Governor and other principal officers of the colony, issued under the act of Parliament for the suppression of piracy; (3.) A commission to the Governor as Vice-Admiral of the colony; (4.) A commission to the judges of the Vice-Admiralty Court. The first two issued from the office of the Secretary of State; the others from the High Court of Admiralty of England.

See Vol. I. p. 144 Am. ed. (p. 158 Edin. ed.).

By his commission, the Governor of the Colony, or other officer, was authorized to create Courts of Admiralty which should hear maritime causes submitted to them, subject to an appeal to the High Court of Admiralty of England. In most cases several colonies were united under the jurisdiction of one Court of Vice-Admiralty. The commissions gave to the courts very considerable powers, and enabled them to take cognizance of all maritime matters, crimes, torts, and contracts, to a greater extent than was permitted to the Admiralty Courts in England. These latter courts, as is well known, had been deprived of a great part of their original jurisdiction through the jealousy and encroachments of the Superior Courts of common law. The Vice-Admiralty Courts of the colonies, however, being created by royal commission, were not bound by decision of the Common Law Courts, nor even by acts of Parliament unless specially mentioned in them. Their powers were given by the document creating them. The fact that the judges of these Courts of Vice-Admiralty were appointed, directly or indirectly, by the Crown, and that their proceedings were without a jury, and in derogation of the common law, tended to make them unpopular with the colonists. Then, too, the large jurisdiction which had been conferred upon these courts, not so much in causes of strict admiralty cognizance as in those for the enforcement of taxes and duties for revenue, increased that unpopularity, and was the occasion of many complaints and petitions to the crown.

At the time of the Revolution, each colony having become a State, and having assumed the rights and powers of sovereignty, most of the States availed themselves of the right to establish Courts of Admiralty. In some States, such as Massachusetts and New York, the court was retained as it had theretofore been constituted, new commissions being granted to the judges. In others, such as Pennsylvania and New Jersey, a new Court of Admiralty was established, and its jurisdiction, in general, set forth. It is to be observed, however, that in none of the States was there any very material change in the subject-matters which were to come within the cognizance of these courts. They were to be, as their predecessors had been, international courts for the trial of all maritime causes, civil and criminal, including, however, the right to condemn prizes of war, a right which did not belong to English Admiralty Courts, as such, but was usually conferred by special commission, issued at the beginning of a war. The jurisdiction and proceedings of these courts were

to be in accordance with the laws and principles governing Courts of Admiralty everywhere in the civilized world, but having been established under the constitution, or by the legislature, of the States respectively, their powers and duties were not absolutely identical.

The Articles of Confederation of the States, which were adopted in Congress Nov. 15, 1777, were finally ratified by all of the States Jan. 30, 1781. Among the rights which were surrendered by the States were those of engaging in war and granting letters of marque and reprisal, and to the United States was given the sole right of "establishing rules for deciding, in all cases, what captures on land or water shall be legal, and in what manner prizes, taken by land or naval forces in the service of the United States, shall be divided and appropriated, ... and of appointing courts for the trial of piracies and felonies committed on the high seas, and establishing courts for receiving and establishing finally appeals in all cases of captures." Subject to these provisions, however, the State courts of admiralty still continued to have jurisdiction, and at the time of the adoption of the Constitution of the United States in 1787 they were still in existence.

The Constitution of the United States provides (Art. I., Sec. 8) that "The Congress shall have power to levy and collect Taxes, Duties, Imposts, and Excises . . . . to regulate Commerce with foreign Nations and among the several States . . . to constitute Tribunals inferior to the Supreme Court, . . . to define and punish Piracies and Felonies committed on the High Seas, and Offences against the Law of Nations, . . . to declare War, grant Letters of Marque and Reprisal, and Make Rules concerning Captures on Land and Water, . . . to provide and maintain a Navy." It also provides (Art. III., Sec. 2) that "The judicial power [of the United States] shall extend . . . to all cases of admiralty and maritime Jurisdiction." Thus the jurisdiction of the States over admiralty and maritime matters and revenue from foreign commerce was surrendered by them to the United States.

The act of Congress of 1789 (commonly called the Judiciary Act) divided the Union into districts, in each of which was established a court to which, among other powers, it was granted to have "exclusive original cognizance of all civil cases of admiralty and maritime jurisdiction, including all seizures under the laws of impost, navigation, or trade of the United States, where the seizures are made on waters navigable from the sea by vessels of ten or more tons burthen, within their respective Districts as well as upon the High Seas, saving to suitors in all cases the right of a Common Law remedy, where the Common Law is competent to give it; and also exclusive original cognizance of all seizures on land, or other waters than as aforesaid, made, and of all suits for penalties and forfeitures incurred under the laws of the United States."

For many years after the adoption of the Constitution, the tendency of the courts, and especially of the Supreme Court, was to hold the jurisdiction in admiralty within the narrow bounds to which it had been restricted in England. In process of time this was seen to be an erroneous view as well of the direct provisions of law as of the necessities of our new and growing country. It came to be understood that there was neither law nor reason in restricting the admiralty jurisdiction to causes arising upon waters "within the ebb and flow of the tide, and below the first bridges." Such a construction (which might be proper enough in a country like England, where the sea, and waters very near it, were the only waters in fact navigable) was utterly inappropriate to a continent abounding in great lakes and rivers, where there is no tide, but over which is carried on a commerce vast in importance and daily increasing. In the year 1845, therefore, an act of Congress was passed purporting to enlarge or declare the jurisdiction of the admiralty, so as to include not only seas and bays, but lakes, rivers, and canals. At about the same time the current of judicial decisions gradually changed, and though the jurisdiction of the United States admiralty courts is still far behind that of all the continental nations of Europe, it is, in many respects, more extensive than that of England.

This jurisdiction is either as to *Instance Causes*, or *Prize Causes*. Instance causes are those relating to crimes, torts (including breaches of the Revenue Laws), and contracts. The right of admiralty courts to take cognizance of the first two depends upon locality alone. That is to say, a cause is one of admiralty cognizance as to crimes and torts, when the crime was committed or the wrong done on any waters which are, in fact, navigable, and upon any form of craft of whatever size, shape, or means of propulsion, provided it may fairly be called a vessel. This is so unless by the act of Congress defining the tort or crime some other rule is established.

Certain writers on admiralty law, as well in America as in England, refuse to consider crimes as instance causes, or indeed to include them in causes of admiralty cognizance: but undoubtedly the only logical reason for conferring upon the courts of the United States jurisdiction over a collision between vessels, or an assault on the high seas, for example, is because these are matters appropriate to admiralty courts, as well in their criminal as in their civil aspect, and whether the suit be brought by indictment at the complaint of the United States, or for damages, at the complaint of the individual injured, can make no difference.

By act of August 18, 1856, and its supplements, guano islands, discovered by a citizen of the United States, are placed within admiralty jurisdiction, to the same extent as if they were vessels belonging to one of our citizens. The District Courts have jurisdiction over all cases of seizure made under the laws of impost, navigation, or trade; and wherever such causes are appropriate to the admiralty jurisdiction, the court sits as a court of admiralty.

In regard to contracts, admiralty jurisdiction depends upon the subject-matter, and it is exercised over all contracts relating to "the navigation, business, or commerce of the sea," lakes, or other navigable waters. The chief of these are charter parties and contracts of affreightment, bottomry bonds, towage, pilotage, wharfage (where the vessel is foreign), demurrage, marine insurance, jettison, average, salvage, seamen's wages, judgments of foreign admiralty courts, controversies between part owners of a vessel as to her employment, and delivery of possession of vessels to those entitled to them, surveys of vessels, contracts with passengers for their transportation, claims of material men and those who furnish supplies to vessels foreign to the State where the work was done or supplies furnished. The latter classes of claimants are also allowed to proceed in admiralty against vessels belonging to their own State, whenever that State has given the right by its municipal laws. The decision of the Supreme Court giving the right to claimants in such cases to proceed in admiralty (The Lottawana,

21 *Wallace*, 201) has been much criticised, but still remains the law. The decision is based upon the principle that although the States have no power to grant to their own courts, or to those of the United States, admiralty jurisdiction, yet they may establish rules by means of which their citizens shall obtain their dues from defaulting vessels; and where such cases are proper subjects of admiralty cognizance, the Federal Courts will enforce the right by the appropriate admiralty remedy, which the State court could not apply. But admiralty jurisdiction is not entertained over contracts merely leading to maritime contracts, nor such as are to be performed on land, as, for example, a contract to enter into a charter party or to build a ship; nor can accounts between part owners of vessels be settled in admiralty, nor can a mortgage upon a vessel be foreclosed. It must be admitted that the law is still somewhat unsettled in several respects. Some of the District Courts entertain jurisdiction of causes which others will not recognize, such as claims for wharfage of domestic vessels, claims by stevedores for loading and unloading vessels, and those of watchmen for taking charge of them; but, of late years, there is much less disagreement between the courts, upon such subjects, than there was formerly.

By several acts of Congress, jurisdiction is also conferred upon the District Courts to carry into effect decrees and awards of the consuls of foreign nations in causes of dispute between their citizens, and to aid such consuls in their proceedings, civilly and criminally. Such causes, or some of them, may, perhaps, be considered a branch of admiralty jurisdiction.

Under several acts of Congress, and in pursuance of treaties with some of the civilized nations of Asia and Africa, and also in all uncivilized countries, consuls of the United States have power to hold courts for the determination of disputes and trial of offences, where citizens of the United States are concerned. This jurisdiction extends, in a limited degree, to admiralty causes, both civil and criminal. An appeal is usually allowed to the United States minister to the country where the consul resides; and in case of China and Japan, an appeal, in all matters involving more than $2500, is allowed to the Circuit Court of the United States for the District of California.

Courts of Admiralty, beside their instance jurisdiction, have also cognizance of the seizure of vessels in time of war, their condemnation as prize of war, and the distribution of the proceeds.

The mode of proceeding in Admiralty Courts of the United States is in accord with the practice under the civil law. All cases are heard upon written allegations and answers, by the District Judge, who decides the case without the intervention of a jury. He may, and frequently does, call to his assistance, as assessors, persons of nautical skill and knowledge; but he is not bound by their opinion. In the act of Feb. 26, 1845, it is provided that "in causes of admiralty or maritime jurisdiction, relating to any matter of contract or tort arising upon or concerning any vessel of twenty tons burthen or upward, enrolled and licensed for the coasting trade, and at the time employed in the business of commerce and navigation between places in different States and Territories upon the lakes and navigable waters connecting the lakes, the trial of issues of fact shall be by a jury when either party requires it." And the act of Feb. 16, 1875, gives to the Circuit Court, on appeal in admiralty, the right to call a jury as to questions of fact, if both parties desire it. These provisions somewhat mar the symmetry of the system of admiralty procedure, but have never influenced the practice to any considerable extent.

In criminal cases in admiralty, whether in the Circuit or the District Court, trial is had before a jury, and according to the course of the common law. This is in accordance with the provisions of the sixth amendment to the Constitution of the United States In such cases it is usual to have a preliminary hearing before a United States Commissioner, an officer appointed by the court, who sits as a committing magistrate. If a *prima facie* case is made out, the offender is committed, or enters bail, to await the action of a grand-jury.

By act of June 11, 1864, in certain criminal cases not capital or otherwise infamous, the district attorney, with consent of the accused, is authorized to submit the case to the district judge, to be tried summarily. In such cases there is no indictment. The case is heard and decided, and the punishment, if any, inflicted by the judge alone. (E. P. P.)

CHAPTER IV.

COURTS-MARTIAL.

Courts-Martial in the army of the United States, in their procedure, bear a strong analogy to like tribunals in the British service. There is one marked distinction, however, between the military courts of the two nations. In the British service their composition and jurisdiction depend largely on the royal prerogative recognized by Parliament in the mutiny act, and the sovereign prescribes the articles of war. In the American service, however, the constitution and jurisdiction of military courts are expressly provided for by law in the "articles of war" enacted by Congress under the authority given by the Constitution "to raise and support armies" and "to make rules for the government and regulation of the land and naval forces." (See ARTICLES OF WAR, Vol. I., p. 333.) Such courts, therefore, in the army of the United States, although courts of special and limited jurisdiction, are, nevertheless, judicial tribunals, whose judgments, in cases within their competency, are just as binding as those of any court of record of civil or criminal jurisdiction.

See Vol. VI. p. 459 Am. ed. (p. 517 Edin. ed.).

By the Articles of War of the United States two kinds of courts-martial are provided, viz.:—General courts-martial, for the trial of any crime mentioned in such articles, and regimental, garrison, or field-officers' courts-martial, for the trial of minor military offences, where the punishment does not exceed the forfeiture of one month's pay or imprisonment at hard labor for a longer period than one month. These minor military tribunals are also inhibited from trying commissioned officers.

General courts-martial may in time of peace be appointed by the President of the United States or Secretary of War, or by a general officer commanding the army of the United States, a separate army thereof, or a separate military geographical department. When, however, any such general officer is the accuser or prosecutor of any officer under his command, the court must be appointed by the President, who thereafter acts on the proceedings of the completed trial. In time of war the commander of a division or of a separate brigade is competent to appoint a general court-martial, unless he is the accuser or prosecutor of any

person under his command, when the next higher commander has to appoint the court.

General courts-martial must consist exclusively of commissioned officers of the army, unless where officers of the marine corps are detached for service with the army by order of the President, in which case the latter also are eligible as members. Each general court-martial is required to have thirteen members as a maximum, unless that number cannot be convened without manifest injury to the service, in which case a less number may be appointed. There must, however, be at least five members and an officer detailed to act as judge-advocate; and the decision of the officer appointing the court announced in the order therefor that a greater number cannot be convened without manifest injury to the service is conclusive. The officiating judge-advocate prosecutes in the name of the United States.

When the accused officer or prisoner is called before such a court, he is entitled to hear read the order appointing the court, and has the statutory right of challenge as to each member present, each challenge to be determined before a new challenge can be received. The member challenged is obliged to withdraw while the remaining members decide upon the relevancy and validity of the challenge. Should members be thus excused from sitting, and the number present be thus reduced below five, the court cannot proceed further until additional members shall have been added by the appointing power. When the right of challenge has been exhausted, the court is then duly sworn according to law by the judge-advocate, and the judge-advocate is duly sworn in like manner by the president of the court, who is the senior member present. These oaths must all be administered in the presence of the person on trial, who is entitled to have the assistance of counsel for his defence and to be informed of the nature of the accusation against him, to be confronted with the witnesses for the prosecution, and to have compulsory process for obtaining witnesses in his favor.

No indictment or presentment of a grand-jury for a capital or otherwise infamous crime is required in a case cognizable by a general court-martial, as such cases, when arising in the land or naval forces, or in the militia when in actual service in time of war or public danger, are excepted by the fifth amendment of the Constitution of the United States. A military charge with its subordinate specification, subscribed by a commissioned officer, stands in the place of a formal indictment. When arraigned, the accused may make any plea such as is recognized in the Circuit Courts of the United States in criminal cases.

The proceedings thereafter are conducted in almost identically the same manner as in such courts of record. As the court-martial is the judge both of the law and the fact, when the testimony is all in and arguments heard, the court is cleared and closed for deliberation on its findings and sentence, as the members are required in their statutory oath to swear that they will not divulge the sentence of the court until it shall be published by the proper authority, neither will they disclose or discover the vote or opinion of any particular member unless required to give evidence thereof as a witness, by a court of justice, in due course of law. The proceedings, findings, and sentence, or acquittal, having been authenticated by the president and officiating judge-advocate, are at once forwarded to the officer who appointed the court, or to his successor for the time being, who must approve the whole proceedings or the sentence cannot be carried into execution. All the proceedings in detail of military courts are required to be reduced to writing and duly authenticated. When, however, a duly sworn stenographer is employed, the proceedings may first be taken in shorthand, such as the *viva voce* examination of witnesses, and subsequently written out. The findings and sentence being determined upon in closed session, none but members and the judge-advocate are authorized to be present.

All persons in the military service of the United States, and all retainers to the camp and persons serving with the armies of the United States in the field though not enlisted soldiers, are amenable to trial by general court-martial for offences specified or included in the articles of war. Three classes of offences come under the cognizance of such tribunal, viz.: (1.) Purely military offences, made such by law in consequence of the nature of the military service, such as desertion, absence without leave, mutiny, disobedience of orders, sleeping on post, conduct unbecoming an officer and a gentleman, etc. (2.) Crimes, whether felonies or misdemeanors, which any civilian may commit in the particular State, district, or Territory, when such crime is prejudicial to good order and military discipline, and committed by a person amenable to trial by general court-martial. (3.) Neglects and disorders to the prejudice of good order and military discipline, which include necessarily serious violations of army regulations, which the President is, by law, authorized to promulgate, or violation of standing post, company, troop, or battery regulations.

Under the first category certain military crimes may, according to the nature and degree thereof, be punished by sentence of death. In time of *peace* desertion cannot now be thus punished. Under the second category only crimes not capital can be taken cognizance of by a military tribunal. In time of war, insurrection, or rebellion, however, exclusive jurisdiction is given in cases of larceny, robbery, burglary, arson, mayhem, manslaughter, murder, and certain other felonies, when committed by persons in the military service of the United States.

The usual punishments by such courts are, according to the character of the crime and the limitation by law, death, cashierment or dismissal, or suspension from rank in cases of officers, dishonorable discharge, forfeiture of pay and allowances, imprisonment with or without hard labor, and dismissal in certain cases of officers with disqualification to hold any office or employment in the service of the United States. No sentence of a general court-martial can be carried into execution against a general officer until it shall have been confirmed by the President, and in time of peace no sentence of dismissal against any commissioned officer will be effective without like confirmation. In time of peace the death sentence cannot be inflicted without his confirmation; but, in time of war, sentences of dismissals of commissioned officers other than general officers, and sentences of death in cases of persons convicted of being either spies, mutineers, deserters, or murderers, or of certain other crimes, may be carried into execution by the commanding general in the field.

The power to pardon or mitigate any offence of which a person is convicted by general court-martial rests by law in the officer appointing the court, unless in a case where confirmation by the President, of the sentence, is necessary. The President, as constitu-

tional commander-in-chief, and invested with the pardoning power, may exercise his prerogative in his discretion.

Military persons sentenced by general courts-martial to dishonorable discharge and imprisonment at hard labor for a definite period become convicts, for the time being; and if the offence is one which a civilian might commit, and which is ordinarily punishable by imprisonment in a State prison or penitentiary, the military convict may be sent there. Otherwise, if he is convicted of a purely military offence, his sentence to hard labor will be executed at some military post, or at the military prison established by Congress at Fort Leavenworth, Kansas.

Regimental and garrison courts-martial are each required to consist of three commissioned officers, and another detailed as judge-advocate. This is the maximum and minimum number. The former court may be appointed by any regimental or corps commander in that portion of the regiment or corps under his immediate command. The latter court may be appointed by any officer commanding a garrison, fort, or other place where the troops consist of different corps. These appointing officers act on the proceedings of such courts, and may pardon or mitigate any punishment which such courts may adjudge.

In time of war a field officer may be detailed in any regiment to act as a field officer's court for the trial of such enlisted men of his regiment as otherwise might be sent before a regimental or garrison court. His jurisdiction is no greater, and his proceedings in any case, before the sentence can become effective, are required to be approved by the brigade commander, or, in case there is no brigade commander, by the post commander.

All proceedings of general courts-martial, when acted upon by the proper reviewing or confirming officer, are sent to the Bureau of Military Justice in the War Department for revision and record. In like manner all proceedings of other courts-martial are sent to the office of the Judge-Advocate of the Military Geographical Department within which such court was instituted.

Courts of inquiry may be appointed by the President at his pleasure, or by any commanding officer, on demand of the party whose conduct is to be inquired into, to examine into the nature of any transaction of, or accusation or imputation against, any officer or soldier. Such tribunals are required to consist of one or more officers not exceeding three, and a recorder to reduce the proceedings and evidence to writing. The court and recorder each take a particular oath, and the party accused may cross-examine opposing witnesses and examine his own. Such courts cannot give an opinion on the merits of the case inquired into, unless specially ordered to do so. Courts of inquiry may be preliminary to a general court-martial, but they do not have any power to try and determine any case and duly administer justice.

Both courts-martial and courts of inquiry have power to issue process to compel the attendance of witnesses. Minor statutory regulations have been enacted as to the time of day when courts-martial may sit, and as to limitations on the time within which an offender must be brought to trial.

In the naval service of the United States courts-martial for the administration of the naval articles of war are entirely the subject of statutory regulation, and consist of general courts-martial constituted the same as in the army, and summary courts-martial of very nearly the same jurisdiction and same number of members as in a garrison court in the army, with a recorder to such inferior court instead of a judge-advocate.

Retiring boards in the army, for the purpose of determining upon the incapacity of any officer for active field service, may be appointed by the Secretary of War, under the direction of the President, and must consist of not less than five, nor more than nine officers, two-fifths of whom must be detailed from officers of the medical department. These courts are duly sworn, and are invested by law with all the powers of a court-martial or court of inquiry necessary for their purpose. Their proceedings are for the information and action of the President.

Military commissions, composed of officers of the army of the United States, are recognized by acts of Congress as tribunals sanctioned by the laws of nations in the time and theatre of belligerent contests.

To the American army is due the credit of enunciating in the clearest terms the laws of war and punishments for violations thereof, and in formulating a summary procedure under such laws, which, while reserving to the particular belligerent the same power of punishment as before, has yet given the accused an opportunity, in a regular way, of proving his innocence of the charges against him, and has thus ameliorated the exercise of arbitrary power originally vested in the commander in the field in such cases. The most notable instance of American procedure under a charge of a violation of the laws of war is to be found in the action of Gen. Washington, as commander-in-chief, in assembling a board of 14 general officers of the army, together with the judge-advocate-general, on Sept. 29, 1780, to consider and determine on the case of Maj. John André, adjutant-general of the British army in North America, who was charged with being a spy. During the war of the Revolution, tribunals were frequently constituted in the American army to try offenders under such laws. In the British service, however, at that time, Gen. Sir William Howe when commanding at New York, and Lieut.-Gen. Earl Cornwallis when commanding in North and South Carolina, executed alleged offenders under such laws in several instances, by direct orders without either prior judicial or quasi-judicial investigation by an army court or board, or opportunity to the accused to be heard in their own defence.

During the war with Mexico Maj.-Gen. Winfield Scott, who commanded the armies of the United States then operating in that republic, promulgated a code of procedure for the punishment of offences against the laws of war, by the instrumentality of military commissions, which became the basis of the American system and fully answered the purposes. This code was first promulgated by him in general orders No. 20, from army headquarters, Tampico, Feb. 19, 1847, and repeated with amendments at Vera Cruz, and finally reissued with additions from his headquarters in the National Palace, city of Mexico, as general orders No. 287, Sept. 19, 1847.

During the war of the Rebellion in the United States, President Lincoln approved and caused to be published in general orders No. 100, April 24, 1863, from the War Department, adjutant-general's "for the information of all [illegible]cerned." [illegible] structions for the governm[illegible], of [illegible] United States in the field, as [illegible]

law), and the mode of punishing offenders thereunder.

Martial law it is thus to be finally noticed is something very different from military law, the first being that branch of the laws of nations applicable to belligerent operations on land and adopted *ex necessitate rei* for the protection of the army in the field and of unoffending inhabitants, and punishments for violations thereof are inflicted by sentences of military commissions duly appointed and sworn and proceeding much as do courts-martial. Military law on the other hand consists of the statutes enacted by Congress for the government of the army of the United States at all times, and is a code found in the revised statutes, known as the "Rules and Articles of War," by which punishments are only inflicted by sentence of courts-martial under express statutes. Martial law therefore derives its authority from the laws of nations, while military law is merely the local code by which each State governs its own forces. (A. B. G.)

COURTNEY, LEONARD HENRY, an English economist, was born at Penzance, July 6, 1832. After preliminary education in that town he went to St. John's college, Cambridge, of which he was elected a fellow after his graduation in 1855. He was called to the bar at Lincoln's Inn in 1858, and in 1872 was made professor of political economy at University College, London. In 1875 he went to India, and in 1876 he was elected to Parliament from Liskeard, and from southeast Cornwall in 1886. In May, 1882, he succeeded the unfortunate Lord Frederick Cavendish as Financial Secretary to the Treasury. He has written much for the *Times* and for various reviews.

COUZA, ALEXANDER JOHN (1820–1873), first prince of Roumania, was born at Husch, in Moldavia, March 20, 1820. He belonged to a noble family and was educated at Paris. Returning to Moldavia in 1839 he was employed in the administration of justice, but having taken part in the revolutionary movements of 1848, he was banished by Prince Michael Stourza. When Prince Gregory Ghika succeeded to power in 1850, Couza was permitted to return and became prefect of the district of Galatz. After the Crimean war he represented that city in the legislative assembly and also attained the rank of colonel in the army. In the provisional government of Moldavia in 1858 he was minister of war, and organized the movement for the political union of the Danubian principalities. For the accomplishment of this project he was first elected Prince of Moldavia in January, 1859, and then prince of Wallachia in February. After long delay he obtained from the Sultan official recognition of his double election, and on Dec. 23, 1861, he proclaimed the union of the principalities under the traditional name of Roumania. The representatives of the whole region were summoned to Bucharest, but when they manifested opposition to the innovations required to carry the treaty of Paris, the prince dissolved the assembly, March 14, 1863. In May, 1864, he arbitrarily ed a new Constitution, embodying the desired and in the following August he freed the ...ry from the rents which had long been exacted ...nob... But his radical measures and the ex... of his administration excited great dis... ...h culminated in a conspiracy, by which ... ...pelled to abdicate his power Feb. 23, 1866. ... ...oved to Austria, and after residing for a ... ...nna went to Italy and finally to Germany. ...rg. May 15 1873.

COVINGTON, a city of Kentucky, in Kenton co., on the Ohio, at the mouth of the river Licking, opposite Cincinnati. Together with Newport and several minor Kentucky towns (Ludlow, Central Covington, West Covington, Belleview, Dayton), it may be regarded as forming a suburb of Cincinnati. It is the N. terminus of the Kentucky Central Railroad. A noble suspension bridge connects it with Cincinnati, and another bridge crosses the Licking, connecting the town with Newport. The principal buildings are the custom-house and post-office, a court-house, a jail, good public-school buildings, a theatre, and an opera house. Other institutions are St. Elizabeth's Hospital, a children's home, a widows' and orphans' home, an infirmary, a foundling asylum, a Benedictine Priory, a boys' Catholic academy and cathedral school, St. Walburga's Benedictine nunnery, 3 Catholic academies for girls, 15 churches (8 Catholic), among which is a cathedral, the city being the see of a Roman Catholic bishop. There are 4 national banks and 1 private bank, with an aggregate capital of $2,200,000. Covington is the seat of very active manufactures; there are several rolling- and rail-mills, wire-works, furniture-factories, stove- and iron-foundries, and many tobacco-factories; also stock-yards, breweries, distilleries, brick-yards, an ice-factory, refrigerating and other warehouses, flour-mills, steamboat yards, car-works, spoke-manufactories, and the like. The city stands on high ground. The water-supply dates from 1871, and is by the Holly system. Covington was founded in 1812, and became a city in 1834. Population in 1870, 24,505; in 1880, 29,720; and in 1890, 37,375.

See Vol. VI. p. 531 Edin. ed. (p. 471 Am. ed.).

COW-BIRD, a conirostral oscine passerine bird, of the family *Icteridæ*, sub-family *Agelæinæ*, and genus *Molothrus*, of which there are several species, all of North, Central, and South America. Their nearest relatives are the Bobolink (*Dolichonyx oryzivorus*) and Marsh Blackbird (*Agelæus phœniceus*). The name "cow-bird" or "cowpen bird" connotes their fondness for gathering where cattle and horses are kept; they may be seen in flocks rambling over the ground about the very feet of the quadrupeds, or even perching upon their backs. There is little to distinguish the cow-birds as a genus from other blackbirds, either in structure, outward form, or general economy; but in one respect they are remarkably unlike any other birds of America, and resemble the parasitic cuckoos of the old world. The *Molothri* live in polygamy, which is rarely practised by passerine birds, and moreover in sexual communism beyond that, for instance, of domestic poultry, for each cock has his own seraglio, whereas the cow-birds mingle in indiscriminate flocks the year round, have no domestic relations whatever, and construct no nests, depositing their eggs by stealth in the nests of other birds, and abandoning their offspring to be hatched and reared by foster-parents. Such eccentricity is the more remarkable in a group of birds all the other members of which display the usual conjugal fidelity and parental devotion, while some of them (the orioles) construct most elaborately woven nests; and there is nothing in the conformation of the cow-bird to account for its peculiar habits. The best known species is *M. ater*, which inhabits the whole of the United States and southern portions of British America. It is particularly numerous in the West, where thousands gather about the isolated ranches and stock-corrals, or follow in the wake of cattle-trains; and where cow-

birds' eggs are the rule rather than the exception in the nests of the prairie birds which build upon the ground. This species is 7¼ to 8 inches long, the wing 4 or more, the tail about 3. The bill is strictly conical, like that of a fringilline bird; the feet are stout, adapted to terrestrial habits, and when on the ground the birds walk by moving the feet alternately, instead of hopping with both together like a sparrow. The male is iridescent black, with metallic lustre, with the head and neck purplish-brown. The female is considerably smaller (wing 3¾, tail 2¾, etc.), lustreless dark grayish-brown, paler below; the young males are similar to the female, but with black shaft lines on most of the plumage. The bill and feet are black in both sexes. The female cow-bird when about to lay deserts the flock, and furtively seeks in shrubbery and herbage for the nest of some other bird, which is occupied by stealth when the owner is away. The unwelcome token of her intrusion left behind, she rejoins her companions. The list of birds ascertained to be victimized in this way is a long and increasing one, comprising most of the small land-birds of the regions the cow-bird inhabits, especially finches and warblers of numerous species, vireos, and flycatchers. The victims are usually (not always) smaller than their persecutor; the cow-bird's egg, therefore, being so much larger than those with which it is deposited, receives the most warmth from the foster-parent's body, so that the rightful eggs may fail to hatch at all, or, if they do, the demands of the sturdy and voracious young cow-bird are such that the parent's own progeny are neglected and often perish. Eggs have been found in the nests of such large birds as the kingbird, and towhee bunting. The alien egg is said (but is not definitely ascertained) to hatch sooner than that of most birds; this would obviously be an advantage, and tend to prevent the other eggs from hatching at all, the parent being required at once to cease incubating and attend to the wants of its spurious progeny. There is usually but one cow-bird's egg in a nest, and it has been supposed that the female lays but one. This is unlikely, however, the probability being that she lays at least four or five, in as many different receptacles. Two, three, even five cow-bird's eggs have been found in one nest, most probably deposited successively by different females. When the intrusion is effected before the owners have laid their own eggs, or begun to incubate them, they usually abandon their nest, preferring the labor of building another to the odious task of incubating the alien egg. Later on, however, they usually face the disagreeable duty resolutely, rather than abandon their own eggs; and then become faithful and devoted foster-parents. Not seldom, however, they resort to an ingenious device, evincing almost human reflection and foresight, by building a second-story to their nest, thus leaving the hateful egg to addle in the cold basement; and in at least one instance—that of a summer-warbler—a three-story nest has been constructed, with a cow-bird egg enclosed in each of the two lower compartments.

A smaller variety of the cow-bird (*M. ater obscurus*) inhabits the S. W. border of the United States. In portions of Texas and Mexico there is a much larger and perfectly distinct species, the brazen cow-bird (*M. æneus*), entirely of the most lustrous and varied iridescence. Others inhabit South America. As far as known, their habits are substantially the same, so far at least as their polygamy and parasitism are concerned. (E. C.)

COWLEY, Henry Richard Charles Wellesley, Earl, a British diplomatist, was born in London, June 17, 1804. His father, the first Baron Cowley, was a brother of the great Duke of Wellington. The son received his education at Eton; went to Austria as a diplomatic attaché in 1824; to the Hague in 1829; to Stuttgart in 1832, and to Constantinople in 1838. Having succeeded to the barony in 1847, he was sent out as minister to Switzerland. In 1851 he became envoy to the Germanic Confederation. He was sent by Lord Derby as ambassador to France, Dec. 6, 1852, and by his personal influence with Napoleon III. did much to shape the course of public events. In the Congress of Paris, Feb. 25, 1856, England was represented by Lords Cowley and Clarendon. As a reward for his diplomatic services, the former was in 1857 created Earl Cowley and Viscount Dangan. He resigned his post in 1867. He died July 15, 1884.

COWPENS, a village of Spartanburg co., S. C., about 5 miles S. of the North Carolina line, and on the Atlanta and Charlotte Railroad, 10 miles from Spartanburg. Here a battle was fought Jan. 17, 1781, in which the Americans under Brig.-Gen. Daniel Morgan defeated the British under Col. Tarleton. The latter had been sent by Lord Cornwallis to drive Morgan out of the north-western part of the State, where he seemed likely to regain a foothold. Morgan, well informed of his opponent's movements, retired till he reached a field of open woods, about two miles from the "cowpens," where the few settlers of the district gathered and marked their cattle from time to time. Here he awaited his pursuer, making all his arrangements with the greatest care. About 300 volunteers from the Carolinas and Georgia under Col. Pickens held the approaches to the field, while 60 sharpshooters were thrown out on each flank as skirmishers. A hundred yards back, the main body, numbering about 400, occupied the highest part of the field, the Maryland light infantry, under Lieut.-Col. J. Eager Howard, forming the centre, and Virginia riflemen each wing. Lieut.-Col. William A. Washington's regiment of dragoons was in reserve behind a second ridge. Tarleton's troops, numbering 1100 men and having two field-pieces, came in sight about 8 A. M. Jan. 17. As soon as they were formed in line, they rushed gallantly forward, and, in spite of the heavy fire, drove in Pickens's militia, who, however, according to Morgan's plan, fell back on the left of the main body. At the second line the British encountered such resistance that Tarleton ordered up his reserves and then fell heavily on the American right flank. To meet this attack, Col. Howard ordered the Marylanders to change front, but through a misunderstanding the whole line fell back in good order to the ridge behind which the cavalry had been posted. There suddenly facing about by Morgan's order they delivered an effective volley of musketry into Tarleton's men, who were pressing on in pursuit. The British veterans recoiled before this unexpected fire, which was followed by a bayonet charge. Before they could recover, Washington, who with the aid of Pickens's militia had already broken the British right, dashed upon the rear of their left and completed the rout. The American loss was only 12 killed and 60 wounded; while the British lost 300 kill and wounded and nearly 600 prisoners. Two -μ which had been captured from the British and retaken at Camden again came into the the A cans. Morgan destroyed the and with his foot soldiers

Broad River on the day of the battle. Although the victory was hailed with the utmost enthusiasm, but little could be done to take advantage of it. Morgan retreated leisurely through North Carolina before the superior force of Cornwallis, and three weeks later was compelled by rheumatism to retire from active service.

COX, Sir George William, an English clergyman and historian, was born in 1827. He was educated at Rugby and at Trinity College, Oxford, whence he graduated with the highest honors in 1849, and received the degree of M. A. in 1859. He was ordained in 1850, and was for a year curate of Salcombe Regis, Devon, and from 1854 to 1857 curate of St. Paul's, Exeter. In 1860 he became assistant master in Cheltenham College, but remained there only a year. On the death of his uncle, Sir Edmund Cox, in Aug., 1877, he succeeded to the baronetcy, being the fifteenth in succession from Sir Richard Cox, chancellor of Ireland. In 1880 he was appointed vicar of Bekesbourne, and is now rector of Scrayingham. In 1850 he began his career as an author by publishing a volume of *Poems, Legendary and Historical*, which was followed in 1853 by a *Life of St. Boniface*. But in 1861 he struck out a new path, in which he at once achieved success by publishing his *Tales from Greek Mythology*. In this little work he set forth in a manner most attractive to the young the stories which have come down from the Greek poets, while in the preface he gave the result of the most recent researches into their real origin and interpretation. The success of this attempt led to the preparation of similar books—*The Great Persian War* (1861), *Tales of the Gods and Heroes* (1862), *Tales of Thebes and Argos* (1863); and these were all collected into one under the title *Tales of Ancient Greece* (1868). To these he added a little school-book called *A Manual of Mythology* (1867). He has since devoted himself chiefly to historical work, and besides contributing to the *Edinburgh Review* has published *Latin and Teutonic Christendom* (1870), *The Mythology of the Aryan Nations* (1870), *A History of Greece* (1874), *The Crusades* (1874), *A General History of Greece* (1876), *A School History of Greece* (1877). Of his larger history of Greece only two volumes have appeared. He has contributed to the ninth edition of the *Encyclopædia Britannica* articles on "Alexander the Great," "The Crusades," etc. He was associated with W. T. Brande in editing the *Dictionary of Science, Literature, and Art* (3 vols., 1865–67; 2d ed., 3 vols., 1875). In 1881 he published a *History of the British Rule in India*. In all of his works he has manifested a truly liberal spirit, as well as faithfulness in the record of facts. His style is animated and perspicuous. In theological views he belongs to the school of Dean Milman and Dean Stanley.

COX, Jacob Dolson, an American general and statesman, was born in Montreal, Canada, Oct. 27, 1828. His youth was spent in New York city; he attended Oberlin College, Ohio, for three years, and was admitted to the bar in 1852. He then practised his profession at Warren, Ohio, and was elected to the State Senate in 1859. On the outbreak of the civil war he was placed in command of a camp of instruction of State militia, and soon after (May 15, 1861) was made brigadier-general of volunteers. Marching into West Virginia he drove the Confederate Gen. Wise out, and, except for a short time, had command of that department until August, 1862, when he was placed under Gen. Pope in the Army of Virginia. In October he returned to the district of the Kanawha; after the death of Gen. Reno he commanded the Ninth Army Corps, and fought at Antietam. He afterwards commanded the Twenty-third Army Corps, and served in the campaign against Atlanta in 1864. For his services in Georgia and Tennessee he was made major-general Dec. 7, 1864. At the close of the war his command formed part of Gen. Sherman's army. In 1866 he was elected governor of Ohio and served two years. In March, 1869, he was appointed Secretary of the Interior by President Grant, but retired from office in October, 1870. He has published *Atlanta* (1882), and *The Second Battle of Bull Run* (1882.)

COX, Samuel, D. D., an English Baptist minister and theologian, was born in London, April 19, 1826. At the age of fourteen he was apprenticed to the London Dock Company, but on the expiry of his term he resigned his post and entered the Baptist college at Stepney. Though the condition of the college at that time was not favorable, he acquired a good knowledge of mathematics and Hebrew, pursuing the latter study under Prof. Nenner. In 1851 he became pastor of the Baptist church in St. Paul's Square, Southsea, and after a successful ministry of four years passed over to Ryde, where his congregation was chiefly composed of Independents. During the four years spent in Ryde a change in his theological views took place, which was afterwards manifested in his best-known work, *Salvator Mundi* (1856). In this he maintains that the final restoration of the whole human family to the obedience and grace of God is the true teaching of the New Testament. The publication of this belief brought on him much trouble, and the alienation of former friends rendered him for some years almost hopeless. An accident which occurred in 1856 has largely shaped his subsequent course. In treating him for an ailment of the throat a surgeon let fall a drop or two of caustic on the vocal chords. For more than a year he wholly lost the power of public speech, and, though his voice has since improved, it has never regained its original clearness. For two years he suffered from penury, but at last obtained employment in writing for the London newspapers and magazines. He was still anxious to return to the work of the ministry, but was unable to find a place till in 1863 he received a call from the General Baptist church, Mansfield Road, Nottingham. His preaching, chiefly expository, has attracted a sympathizing congregation. Owing to a nervous disease, he now preaches but one sermon a week. His main work is literary, and his expositions of the Scriptures have passed through several editions. The most valuable is his *Commentary on Job*, which has been pronounced by Hebrew scholars the best popular exposition of that sublime poem yet given to the English public. Among his other works are—*The Private Letters of St. Paul and St. John* (1867), *The Quest of the Chief Good* (1868), *The Resurrection* (1869), *An Expositor's Note-book* (1872), *Biblical Expositions* (1874), *The Pilgrim Psalms* (1874), *A Day with Christ* (1876), *The Book of Ruth* (1877), and the *Genesis of Evil* (1880). He is also editor of *The Expositor*, a magazine intended to give the latest results of biblical investigation by the best scholars of Great Britain. In 1873, Rev. Mr. Cox was elected president of the General Baptist Association, and his address was published in the *British Quarterly*. In 1882 he received the degree of D. D. from the University of St. Andrews.

COX, Samuel Hanson, D. D., LL.D. (1793–1881), an eminent and eloquent Presbyterian divine, was born at Rahway, N. J., Aug. 25, 1793, of a family most of

whose members belonged to the Society of Friends. He was educated at the Friends' school at Westtown, Pa., and in 1811 began to study law at Newark, N. J. About this time he became a convert, and in 1813 was baptized in the Presbyterian communion. He then studied theology, was licensed to preach Oct. 10, 1816, and ordained pastor at Mendham, N. J., in the following July. At the close of 1820 he was transferred to New York City, where his congregation was largely composed of leading merchants. He took a foremost part in founding the University of the City of New York in 1831, and as professor of moral philosophy delivered a memorable course of lectures. During the cholera season of 1832 he remained at his post until stricken down by the disease. In the following year, his health being impaired, he went to Europe, and made an eloquent address in London at the anniversary of the British and Foreign Bible Society, which greatly extended his fame. Dr. Cox while abroad had earnestly defended his country against calumniators, but returned deeply impressed with the necessity of action in regard to slavery. Soon after he preached a celebrated sermon, which, though moderate in tone, drew upon him the odium then attached to the name of abolitionist, and in consequence his house and church were sacked by a mob, July 10, 1834. In the following autumn he was chosen professor of pastoral theology in the seminary at Auburn, N. Y., and remained there three years. At the division of the Presbyterian denomination he was a prominent champion of the New School, though in regard to order and discipline he was strongly conservative. In 1837 he became pastor of the First Presbyterian Church at Brooklyn, where for several years he maintained a position of great eminence, and for a considerable part of the time he was professor of ecclesiastical history in Union Theological Seminary at New York. He actively encouraged temperance and other benevolent and reformatory movements of his time. In 1846 he was chosen moderator of the General Assembly of the Presbyterian Church (N. S.), and was a delegate to the Evangelical Alliance in London. In April, 1854, on account of failing health, yet against the remonstrances of his congregation, he resigned his charge and retired to Owego, N. Y., but for several years continued to preach occasional sermons and deliver lectures in New York. He died at Bronxville, Westchester co., N. Y., Oct. 2, 1881. He married, in 1817, Abia Hyde, a lady of great refinement and daughter of Rev. Aaron Cleveland of Connecticut, somewhat noted as a poet in his time (1744–1815). His second wife was Anna, daughter of George Bacon of Hartford, Conn. He received the honorary degree of A. M. from Princeton College in 1818, and that of D. D. from Williams College in 1825, but in a public letter declined to accept what, in characteristic style, he called "the semilunar fardels." Nevertheless, he was henceforth known as Dr. Cox, and in 1855 he received the additional degree of LL.D. from Marietta College, Ohio. He was a man of high character, of great boldness in expressing his convictions, and of remarkable power and magnetism as an orator. His style was peculiar, and he did not hesitate to introduce strange Latin derivatives, and even phrases, into popular addresses. Besides sermons and pamphlets he published *Quakerism not Christianity*, 1833, and *Interviews, Memorable and Useful, from Memory reproduced*, 1853. He left large collections of unedited manuscripts, which in the judgment of his friends are more valuable than anything he ever published.

COX, SAMUEL SULLIVAN, an American statesman, was born at Zanesville, Ohio, Sept. 30, 1824. He studied at Ohio University, Athens; and graduated at Brown University in 1846. He became a lawyer, politician, and editor in Columbus, Ohio, and in 1855 was appointed secretary of the United States legation in Peru. He was a democratic member of Congress from the Columbus district, Ohio, 1857–65, and having removed in 1865 to the city of New York was again elected to Congress in 1868. He has been several times re-elected. He is author of *The Buckeye Abroad* (1852); *Eight Years in Congress* (1865); *A Search for Winter Sunbeams* (1870); *Why We Laugh* (1876); *Orient Sunbeams* (1872); and *Three Decades of Federal Legislation* (1885). Though a lover of humor, he was diligent in the public service, and an earnest and effective speaker. He was chairman of the committee on the census of 1880, a member of the committee on commerce, and one of the leaders of his party in the House. He was appointed Minister to Turkey in 1885, but returned in October, 1886, and was re-elected to Congress. He died Sept. 10, 1889.

COXE, ARTHUR CLEVELAND, D. D., an American bishop of the Protestant Episcopal Church, was born at Mendham, N. J., May 10, 1818. He is a son of Rev. Dr. Samuel Hanson Coxe. He was graduated at the University of the City of New York in 1838. While an undergraduate he composed several poems, and in 1837 published a sacred drama entitled *Advent, a Mystery;* also in the following year *Athwold, a Romaunt*, and *Saint Jonathan, the Lay of the Scald*, a humorous poem which was never completed. While a student at the General Theological Seminary, New York, he sent forth two more volumes of poetry, one of which, *Christian Ballads*, consisting of poems chiefly suggested by the seasons and services of the Church, has given him a wide reputation and enduring fame. The *Ballads* have passed through several editions in England as well as in America. Mr. Coxe was ordained deacon in 1841, and in August of that year became rector of St. Anne's Church, Morrisania, N. Y., and in 1842 of St. John's Church, Hartford, Conn. He next published *Saul, a Mystery, Hallowe'en, and Other Poems*, and *Sermons on Doctrine and Duty*. Having visited Europe, he gave to the world his *Impressions of England; or, Sketches of English Scenery and Society*, 1853. In 1855 he became rector of Grace Church, Baltimore, where he published his *Apology for the Common English Bible*. During the agitation of the Civil War he was a firm supporter of the Union. In 1863 he became rector of Calvary Church, New York, and two years later was consecrated bishop of Western New York. In 1869, when Pope Pius IX. had invited all Christian bishops to attend the Vatican Council, Bishop Coxe sent a reply which was translated into most European languages. He has been a frequent contributor to the *Church Review*, the *Independent*, and other periodicals, has published pastorals on theological subjects and on moral reforms, and translated from the French and German several controversial works. He is the author of a volume in the French language (published in Paris in 1875), *L'Épiscopat de l'Occident*, and of several smaller treatises published by the "Anglo-Continental Society," of which he was one of the founders. His *Apollis*, *Criterion*, and other theological works have been republished in England. In 1872 he visited Hayti, and spent several weeks organising a diocese.

COXE, JOHN REDMAN (1773–1864), an American

physician, was born at Trenton, N. J., in 1773. He studied medicine under Dr. Benjamin Rush, of Philadelphia, and in London, Paris, and Edinburgh. He settled in Philadelphia in 1796, and was port-physician in 1798 during the yellow fever epidemic. He was the first to introduce vaccination in that city. For many years he was a physician of the Pennsylvania Hospital and of the Philadelphia Dispensary. In 1809 he was appointed professor of chemistry in the University of Pennsylvania, and in 1818 was transferred to the chair of materia medica, which he retained till 1835. He edited the *Philadelphia Medical Museum* from 1805–11, and began the translation from the French of the *Emporium of Arts and Science* (1812), which was continued by Dr. Thomas Cooper. His own works comprise treatises on *Inflammation* (1794); *Vaccination* (1800); *Combustion* (1811); *American Dispensatory* (1827); *Refutation of Harvey's Claim to the Discovery of the Circulation of the Blood* (1834); *Epitome of Hippocrates and Galen* (1846). He also published *Recognition of Friends in Another World* (1845); and *Female Biography*. Dr. Coxe never had a sick day in his life, and died without any appreciable disease at Philadelphia, March 22, 1864.

COXE, Tench (1755–1824), an American political economist, was born in Philadelphia, May 22, 1755. He was educated in the Philadelphia College, and became in 1776 a partner in a leading mercantile house. In 1786 he was sent as a commissioner to the Federal Convention at Annapolis, and in 1788 he was elected a member of the Continental Congress. He was appointed Assistant Secretary of the Treasury in 1790, when the duties of the office were peculiarly important—since Alexander Hamilton was then laying the foundation of the financial system of the United States. He was Commissioner of the Revenue from May, 1792, to March, 1797. He advocated the election of Jefferson to the Presidency, but devoted his attention chiefly to the encouragement of American manufactures. He was one of the founders of the Pennsylvania Society for the Encouragement of Arts and Domestic Manufactures, instituted in 1787. Among his numerous works are: *An Inquiry into the Principles of a Commercial System for the United States* (1787); *A View of the United States* (1794); *Thoughts on Naval Power and the Encouragement of Commerce and Manufactures* (1806); *On the Navigation Act* (1809); and a *Statement of the Arts and Manufactures of the United States for* 1810 (1814). He died July 17, 1824.

COYPU, Couia, or Racoonda, a South American quadruped, *Myopotamus Coypu*, belonging to the hystricine series of simplicident *Rodentia*, family *Octodontidæ*, sub-family *Echinomyinæ*. The animal is aquatic in habits, and somewhat resembles a beaver, but has a cylindric-tapering tail about two-thirds as long as the head and trunk, like that of an otter—a circumstance which appears to have led to some confusion, the valuable fur of the Coypu being known in commerce as *nutria*, which is the same word as *lutra*, an otter. It is one of the largest of living rodents, surpassing a beaver in dimensions, and only itself exceeded in size by the Capybara (*Hydrochœrus capybara*). The form is stout; the muzzle blunt; the ears small; the hind-feet enlarged, with four full-webbed digits and a fifth free digit. The incisor teeth are very large and powerful, plane and ungrooved; there is, as usual in hystricine rodents, one premolar above and below, giving with the three molars 16 back teeth. The enamel-folds are curved and deep, those of the upper teeth making one internal and two external loops, those of the lower teeth three internal and one external. The general color of the fur is brown above, brownish yellow below, usually white about the muzzle. The Coypu lives on the banks of rivers and lakes, sometimes the seashore, from about 15° N. to 23° S. lat., inhabiting burrows in the ground, and subsisting chiefly upon vegetable food, especially the roots of aquatic plants. It swims freely in the water, often transporting its young upon its back in that element. The female has four pairs of teats, situated high up on the side of the body, behind the shoulder and in front of the hip; four or five young are produced at a birth. The chief exportation of nutria fur is from Buenos Ayres. (E. C.)

CRAIK, Dinah Maria (Mulock), an English novelist, was born at Stoke-upon-Trent, Staffordshire, in 1826. Her father, an Irishman of a literary turn and somewhat eccentric, wrote a book called *Atheism Answered*, and is mentioned in Moore's *Life of Byron*. Miss Mulock's first novel, *The Ogilvies*, appeared anonymously in 1849; it was quickly followed by *Olive* (1850), *The Head of the Family* (1851), and *Agatha's Husband* (1852). Though these met with some favor, it was not till the publication of *John Halifax, Gentleman* (1857), that the author, who still remained anonymous, achieved a decided success. She had modified the sentimentalism and too feminine tone of her former works and improved in the presentation of character. Though she afterward wrote many stories, she never surpassed this effort, and still is best known as the "Author of *John Halifax*." Her subsequent novels were *A Life for a Life* (1859), *Mistress and Maid* (1863), *Christian's Mistake* (1865), *A Noble Life* (1866), *Two Marriages* (1867), *The Woman's Kingdom* (1869), *A Brave Lady* (1870), *Hannah* (1871), *My Mother and I* (1874), *The Laurel Bush* (1876), *Young Mrs. Jardine* (1879), etc. She was an eminently domestic writer, describing the common joys and sorrows, trials and vicissitudes, of Scotch and English families of the present day. Her delight was to set forth a happy home as woman's kingdom, but was less successful in depicting strong masculine traits and in making her characters individual. Besides her novels, she published a number of short stories and children's books, as well as volumes of essays. Among these are—*A Woman's Thoughts about Women* (1858), *Sermons out of Church* (1875), *His Little Mother* (1881), *Plain Speaking* (1882). From time to she contributed to various magazines poems of tender sentiment and domestic interest, and some of these were collected into a volume in 1860. A later collection, including these and many more, has been published under the title *Thirty Years, being Poems Old and New* (1881), *Children's Poetry* (1881). She also compiled and arranged a volume of music entitled *Songs of our Youth* (1875). A little book on *Fair France* (1871) gives a sketch of a visit to that country. In 1864 a literary pension of £60 was granted to Miss Mulock by the British Government, and in 1865 she was married to Mr. George Lillie Craik. She died Oct. 12, 1887.

CRAIK, Georgiana M., an English novelist, born in London, April, 1831, the youngest daughter of the well-known author, George Lillie Craik (1799–1866). After her father's removal to Belfast in 1850 she began to contribute to the periodicals short stories, and in 1857 appeared her first novel, *Riverston*. In 1867, after her father's death, she returned to London. Among her novels are *Lost and Won: Winifred's Woo-*

ing; Faith Unwin's Ordeal; Leslie Tyrrel; Mildred; Hero Trevelyan; Esther Hill's Secret; Without Kith or Kin; Theresa; Only a Butterfly; Sylvia's Choice; Anne Warwick; Hard to Bear, and *Dorcas*. Among her books for children are *My First Journal; Playroom Stories; Cousin Trix; The Cousin from India; Miss Moore;* and *Janet Mason's Troubles*.

CRAKE. I. Properly a European bird, found also as a straggler to America, of the family *Rallidæ*, and genus *Crex;* the land-rail or corn-crake, *C. pratensis*, about 10 inches long, varied above with yellowish and blackish-brown, of less aquatic habits than those of rails generally.

See Vol. VI. p. 481 Am. ed. (p. 542 Edin. ed.).

II. From their general similarity, any of the short billed species of rails, of the genus *Porzana* and its allies, receive also the name of *Crake*. The bill is shorter or not longer than the head, straight and comparatively stout; other characters are much as in the rails at large (*Rallus*). There are numerous species, of most parts of the world, mostly of small size, under that of the corn-crake. The North American Sora (*Porzana carolina*), yellow-breasted rail (*P. noveboracensis*), and little black rail (*P. jamaicensis*) are good examples. The names *crex, crake*, like *creak, crackle*, are onomatopoëtic, expressing the cry of the birds: as indeed is *rail*, Fr. *rasle* or *râle*, Lat. *rallus*. See RAIL. (E. C.)

CRANBROOK, GATHORNE HARDY, VISCOUNT, a British Conservative statesman, was born at Bradford, Yorkshire, Oct. 1, 1815. He was educated at Shrewsbury and at Oriel College, Oxford, where he graduated B. A. in 1836. In 1838 he married, and in 1840 he was called to the bar at the Inner Temple. In 1856 he entered Parliament for Leominster, and in 1858 he became Under-Secretary for the Home Department. After representing Leominster for nine years, in 1865 he was elected to Parliament both by this constituency and by the University of Oxford. He then chose to represent the latter. In 1866 he was sworn of the Privy Council and made president of the Poor-law Board, and in the next year was Home-Secretary. During the Parliamentary struggle which resulted in the disestablishment of the Irish Church, he was a conspicuous defender of that institution. In 1874, under Lord Beaconsfield, he was appointed Secretary of State for War, and in 1878 he received the burdensome portfolio of Secretary of State for India. In the same year he was raised to the peerage, and was Lord President of the Council from 1885 to 1889. As a commoner he was a firm friend of Beaconsfield, and was distinguished for earnestness of purpose, and decision of character.

CRANE, a large long-legged wading bird, of several distinct genera of the family *Gruidæ*, and order *Alectorides*. Owing to their stature and general superficial resemblance, the cranes have been wrongly referred to the order *Herodiones;* but they have really little in common with the herons, storks, ibises, etc., their ordinal relationships being with the courlans, rails, and gallinules. The cranes are all large birds, with very long legs and neck, some of them standing the highest of any carinate birds. There are three very distinct genera. One of these is represented by the elegant African crowned crane (*Balearica pavovina*), in which the head is adorned with an upright tuft of feathers of peculiar texture, resembling a small wisp or clothes-brush. The graceful and gentle "demoiselle" or "paradise" cranes (*Anthropoïdes virgo, A. paradisea*) are related forms of Africa, India, and Southern Europe. Most of the species, however, to the number of about twelve, fall in the single genus *grus*. In this the head has no kind of crest, but is in part naked and colored; the general plumage is compact, either snowy white set off with black, or ashy; some of the inner wing-feathers are enlarged, arched, and then pendant; the bill is as long as the head or longer, straight, stout, compressed throughout, contracted in the middle, opposite the nostrils, which are large and completely pervious; the tibiæ are extensively denuded above the suffrage; the tarsi are scutellate in front; the toes short, the anterior ones webbed at base, the hinder one elevated. In most if not all the species of this genus the breast-bone is hollowed out to receive foldings of the wind-pipe, which may make several coils in the bone before passing to the lungs. In the whooping crane, for example, in which this peculiarity is carried to an extreme, the entire windpipe is about four feet long, and over half of it is coiled away in the sternum. Cranes inhabit both marshy places and high and dry plains; they are extremely wary and vigilant, and when feeding in flocks, as is their custom, usually have one or more sentinels on the watch for danger. A broken-winged crane is a dangerous antagonist, owing to the force and rapidity with which spear-like thrusts of the bill may be given. Extensive migrations are performed by most of the species with great regularity, flying in bands like wild geese, high overhead. The voice is loud, raucous, and resonant to the highest degree, consisting of harsh rattling cries frequently repeated. The eggs are generally two in number, of an elliptical rather than ovoid shape, of drab or olivaceous ground-colors, heavily marked with darker colors. The young are usually rusty or reddish colored at first. The two best-known species are the white and gray crane of Europe, *Grus leucogeranus* and *G. cinerea*. The North American species are three in number. 1. The white or whooping crane, *G. Americana*, one of the largest and handsomest of the genus, is, when adult, pure white with black primaries, primary coverts and bastard wings; the head extensively naked, carmine-red, with scattered black bristles. The length from end of bill to end of tail is upwards of 4 feet; the standing height is much more, the tarsus alone being nearly a foot long; the wing is 2 feet long, the extent of the wings some 7 or 8 feet. This magnificent bird appears to have been formerly distributed over most of the United States, the earlier writers reporting it from the Atlantic coast and various interior points; it is now, however, chiefly confined to the Mississippi Valley and westward, from Dakota to Texas. 2. The brown or sand-hill crane, *Grus pratensis*, was long supposed to be the young of the preceding, but is now generally conceded to be distinct. The head is less extensively denuded, with an entirely different outline of the feathers; the plumage is ashy or plumbeous-gray, never whitening, with the primaries and border of the wing black; the size is decidedly less than that of *G. Americana*, and the coiling of the wind-pipe in the breast-bone is much less extensive. It has inhabited temperate North America at large, but, like the whooping, is nearly or quite exiled now from the more [illegible] populated portions of the United States. [illegible] *Grus fraterculus*, of C[illegible]posed to be *G. Canadensis* of [illegible] brown or sand-hill crane, now [illegible]

distinct from *G. pratensis*, but perhaps not fully established as a species. It inhabits portions of British America and Mexico, with the intervening part of the United States west of the Mississippi. (E. C.)

CRAPE MYRTLE, the common name of a highly ornamental shrub very popular in the southern portion of the United States, into which it has been introduced from the East Indies. It belongs to the natural order *Lythraceæ*. It has six sepals and six long-clawed rosy petals, which are beautifully craped or fringed, from whence its common name. It is the *Lagerstromia Indica* of botany. One species, *L. reginæ*, is the jarool, a famous timber-tree of Burmah. Our cultivated kind grows about 10 or 15 feet high, making sometimes a trunk 12 or more inches in circumference, in the States south of the Potomac. North of this it is killed to the ground in the winter, if not wholly destroyed. (T. M.)

CRAWFORD, William Harris (1772–1834), an American statesman, was born in Nelson co., Va., Feb. 24, 1772. When he was about 7 years of age his father removed with his family to South Carolina, and in 1783 crossed the Savannah and settled in Columbia co., Ga. After his father's death in 1788, Crawford, then only 16 years of age, began to teach school, and after reaching manhood he attended Rev. Dr. Waddell's academy for two years. He then commenced the study of law, still supporting himself by school-teaching, and in 1798 was admitted to the bar. The legislature of Georgia in 1800 appointed Crawford and Horatio Marbury to revise the laws of the State. Within two years the work was accomplished satisfactorily and the first *Digest* published. Being elected to the legislature in 1802, Crawford became a leader of the Republican party, adopting heartily the principles of Jefferson, and adhering to them tenaciously throughout life. After serving four years in the legislature, he was chosen to the United States Senate. During the canvass for this position he fought two duels, in the first of which he killed his opponent, and in the other he himself was severely wounded. His ardent friendship for Jefferson did not prevent him from objecting to the embargo bill when first proposed, but after it had gone into operation he voted against its repeal. In the same way he was opposed to the declaration of war against England in 1812, but finally consented to it as demanded by his party. Gallatin, then made secretary of the treasury, strongly urged the necessity of a national bank, and found in Crawford an effectual supporter of the measure. Being still inclined to peace, Crawford in 1813 declined a seat in President Madison's cabinet as secretary of war, and was appointed minister to France. During his residence abroad he became an intimate friend of Marquis Lafayette, who afterwards appointed him agent of his property in America. Being recalled at his own request in 1815, Crawford, while yet on his return voyage, was made secretary of war, but a year later he was transferred to the treasury department by President Madison. In this position he remained through both terms of Monroe's administration, and towards its close was generally regarded as the legitimate successor of the Virginian dynasty which had long ruled the councils of the nation. But he was opposed by Calhoun, then r into prominence, and by those who wished the l government to assist the States in making improvements. His official integrity was im- without success. He is more justly resorting to intrigue to secure the object ion. According to previous custom a members of Congress belonging to the Republican party was called, which, however, was attended only by his friends, about one-third of the whole number, while the others refused to participate in it or be governed by its decision. Though Crawford was thus the regular nominee, the party was disintegrated and the ensuing campaign became a personal contest in which Crawford, Gen. Jackson, John Quincy Adams, and Henry Clay, all belonging to the Republican party, were the candidates. Gen. Jackson received the highest number of electoral votes but did not have a majority, and the election devolved on the House of Representatives, voting by States. Crawford had been incapacitated by paralysis, yet his name was presented and he received the votes of four States. John Quincy Adams, who had been secretary of state throughout Monroe's administration, was able to attract the other opponents of Jackson and obtained the presidency by the votes of 13 States. Crawford's health afterwards improved to some extent, but his political career was closed. Returning to his home in Georgia, he lived for a time in retirement. In May, 1827, he was appointed judge of the northern circuit of Georgia, and served as such the remainder of his life. Though he was infirm and partially disabled, his sight and speech being both affected, his mind remained clear and he discharged his duties to the satisfaction of his fellow-citizens. He died near Elberton, Ga., Sept. 15, 1834.

CRAWFORDSVILLE, a city of Indiana, the county-seat of Montgomery co., is on Sugar Creek, 44 miles west of Indianapolis. It is at the intersection of the Louisville, New Albany, and Chicago Railroad with the Indiana, Bloomington, and Western Railroad, and on the Logansport branch of the Indianapolis and Terre Haute Railroad. It has 3 hotels, 3 banks (2 national), 2 daily and 5 weekly newspapers, 10 churches, and graded schools. The industrial works comprise 2 foundries, a woollen-factory, coffin-factory, barbed-wire-factory, 3 flour-mills, 3 planing-mills. It was settled about 1820, and in 1834 Wabash College, a Presbyterian institution of some prominence, was established here. The city has well-paved streets lined with maple trees. Population, 6086.

CREASY, Sir Edward Shepherd (1812–1878), an English jurist and historian, born at Bexley, in Kent, Sept. 12, 1812. He was a king's scholar on the foundation at Eton; proceeded in 1831 to King's College, Cambridge, and became a fellow of his college in 1834. He was called to the bar at Lincoln's Inn, in 1837; was afterwards a deputy assistant judge for the Middlesex sessions. He was professor of history in University College, London, 1849–58. He was appointed chief-justice of Ceylon in 1860, and received the honor of knighthood. In 1869 he returned to England on account of ill health, and in 1875 was appointed professor of jurisprudence and Roman law in the Inns of Court. He died in London, Jan. 27, 1878. He was a sound and able lawyer, and acquired a high repute as an author. Among his writings are, *An Account of the Foundation of Eton College; Sub Rege Sacerdos; Text-Book of the Constitution; Memoirs of Eminent Etonians* (1850); *The Invasions of England;* the extremely popular *Fifteen Decisive Battles of the World* (1851), which has been through many editions; *Rise and Progress of the English Constitution* (1834); *History of the Ottoman Turks; History of England* (vol. i. 1869, vol. ii. 1870, incomplete); *The Old Love and the New*, a novel (1870); a work on the *Imperial and Colonial Constitutions of the British Empire* (1872); *First Platform of International Law* (1876).

CREEDMOOR, a small post-village of Queen's co.,

N. Y., having a station of the Central R. R. of Long Island, 12 miles east of New York City. On account of its topography it has long rifle-ranges, and is well suited for target-practice. The National Rifle Association meets here, and local clubs are constantly practising here. Great matches occur not only between local associations, but American and English teams meet to contest for the palm. It corresponds to Wimbledon in England. (H. C.)

CREEK INDIANS, more correctly called Muscogees or Muskoki, the principal tribe of the so-called Appalachian or Chahta-Muskoki stock. They formerly lived in Georgia, Florida, and Alabama, and were of many minor tribes. The name Creeks is said to have been given on account of the numerous watercourses which intersect their old habitat. Among the minor Creek peoples were the Alabamas, Coosas, Hitchitees, Appalachees, Cowetas, Cussetas, Coosadas, or Coushattas, and others. The Seminoles and Mikosukies of Florida were Creek offshoots. Various local tribes, not clearly Appalachian, were at one time or another absorbed in the Creek nation. From their wide territorial range, the Creeks in colonial times had little tribal unity. The French of Mobile, the Spaniards of Florida, and the English colonists all sought the Creek alliance, and together they succeeded in keeping the tribe from developing any solidarity or community of action. Yet there is mention of Coweta "emperors" who seem to have had a sort of suzerainty over the whole Muscogee name. The Creeks were never strongly hostile to the English. In the Revolutionary war and in that of 1812–15 they were very active friends of the English. In the latter war they took a very important part, and it required the most vigorous operations on the part of the United States forces, led by Gens. Jackson, Coffee, Claiborne, and others, to put down the Creeks. The Indians made a stout resistance, but were everywhere completely overpowered. Long before this many Alabamas and Coushattas, with some other Muscogees, had removed to Texas and Louisiana, where a remnant of their descendants still exists. In 1825 a large part of their land, including most of what they retained in Georgia, was ceded. Renewed hostilities with the Alabama Creeks led to their forcible and almost complete expatriation. After the removal of the Creeks to the Indian Territory they they did not prosper for a long time. They for some years refused civilization, schools, and Christianity, and rapidly declined in numbers; and even now they do not number over two-thirds as many as when they first were removed. During the war of 1861–65 the tribe divided, and several severe battles were fought; but the Confederate party gained the advantage and drove the Unionists out of the country. The latter took refuge in Kansas, but afterwards returned to Indian Territory. Since the war the Creeks have prospered. Their freedmen have been adopted as Creek Indians, and their long controversy with the Seminoles has been settled. This controversy arose partly by the mistake of United States agents who placed some of the Seminoles on Creek land, and partly from the Indian obstinacy and suspicion, which would permit no regular survey of the ground. There are in the Creek nation two factions, the Chicote party and the Sands party, but there are at present no real grounds for party difference. The tribe has a governor or head chief, and a second chief. The legislature sits at Okmulkee, and consists of a house of kings and a house of warriors. There are one supreme and five district courts. The school system is well sustained. The present Creek country is bounded N. by the lands of the Osages and the Cherokees, E. by that of the Cherokees, S. by the country of the Choctaws, and W. by that of the Seminoles, Sacs, Foxes, and Pawnees. Its area is 3,215,495 acres. The Arkansas river flows through it. They have also large tracts of unoccupied lands farther west. The Creek country is of varied character, well wooded and fertile, three-fifths of the land being arable. Cattle-raising is a leading industry. Pecan-nuts are extensively produced, but the main crops are corn, wheat, and some cotton. The Creeks have two languages, the Muskoki and Hitchitee, the latter said to be nearer to the Choctaw than to the true Creek tongue. The Seminoles use the Muskoki. The Alabamas and Coushattas have, or once had, dialects akin to the true Muskoki, and it is stated that the former once had a separate language for their women's use. Minor bands of Creek race are living in Polk co., Texas, and in Louisiana. (C. W. G.)

CREEPER, a name very loosely and indiscriminately applied to numberless small tenuirostral birds of more or less scansorial habits, chiefly of the order *Passeres*, but of several different families. I. For the creepers properly so-called, see *Certhiidæ*. II. The European wall-creeper, *Tichodroma muraria*, typifies a special section of the family *Certhiidæ*. III. The black- and white-creeper of N. America, *Mniotilta varia*, is one of the *Sylvicolidæ* or wood-warblers. IV. The honey-creepers of the West Indies and other warm parts of America constitute the family *Dacnidæ*, related to the *Sylvicolidæ*, but having extremely acute, decurved bills and other peculiarities; the species are numerous, chiefly of the genera *Dacnis* and *Certhiola*. The latter is specially characteristic of the West India Islands; one of the species (*C. bahamensis*) also occurs in Florida. V. The tree-creepers (*Dendrocolaptidæ*) are a large and varied family, of numerous genera and species, peculiar to South America. VI. Others, too numerous to mention, having the least possible affinity, were by the earlier ornithologists classed in the genus *Certhia*, and called creeper, or its equivalent in other languages. The name has thus no precision in meaning, and very little classificatory significance, in ornithology. (E. C.)

CREES, or KNISTENEAUX, a tribe of American Indians, of the Algonkin family, who occupy a very extensive district in Northern Canada, extending from Hudson's Bay to the Rocky Mountains, and in a north and south direction from Lake Winnipeg to Lake Athabasca. By the valley of the Red River they extend to the borders of the United States. Here they come into contact with the Sioux (Dakotas) and Blackfeet, with whom they long waged war.

The tribe is divided into several bands, in accordance with their localities and modes of life, as the Plain Crees, the Strongwood Crees, and the Swampy Crees of Lake Winnipeg, the latter named being the lowest in character and condition. The Crees are a well-built and athletic race, and their women are more attractive in appearance than Indian women generally. They are friendly and hospitable in character, though some writers speak of them as arrant thieves.

Like the Indian tribes of the Southern plains, the Crees formerly trusted for subsistence to the buffalo, which visited their region in immense herds. The almost complete extinction of the buffalo deprived them of their principal food, and they were forced to turn to smaller game,

dained. Agents have been appointed by the government to teach them the art of agriculture, to which some of them begin to display an inclination. The authorities of the British possessions have dealt with their Indian tribes in a very different method from the United States, and have respected their territorial claims. The Indians, in return, have surrendered all their lands but certain reservations, retaining the privilege of hunting on all unoccupied lands. The Crees have been considerably reduced in numbers in recent years, especially by small-pox, and are now estimated at something over 6000 souls.

CREMATION. Since 1876 the practice of cremation has made notable progress, and the movement has attained what for a long time to come must be regarded as its final stage, in which the legality of this method of disposing of the dead is admitted; and the stimulating effect of opposition or novelty being no longer felt, the extent of its practice (nowhere general) is determined by local conditions and personal preferences.

See Vol. VI. p. 500 Am. ed. (p. 565 Edin. ed.)

In 1878 the Cremation Society of England purchased an acre of land in a secluded part of the parish of Woking, in Surrey, with a view of erecting a crematory there after the system of Prof. Gorini. The receiver is a flat-bottomed chamber, open at each end, one end communicating with the upper part of the furnace, the other with the lower part of the chimney. The furnace, which discharges its heat into the receiver, is sufficiently spacious to produce the necessary heat by means of wood-fuel only, and the chimney is of sufficient sectional area to remove the products of combustion from the receiver as well as the furnace, and high enough to permit the draught to keep above the gases pervading the receiver, and prevent any dispersion of heat or smoke through the apertures around the receiver or cremation-chamber. A grating is placed near the base of the chimney, on which a fire of coke is kindled; thus the products of animal combustion which issue, still highly heated, from the receiver, are subjected to a higher temperature in passing through the burning coke, and such organic matter as may have resisted or escaped the first combustion is destroyed by the second and mixes harmlessly with the atmosphere. Experiments having shown that cremation was possible by this system without offence to any sense, the council of the society waited upon the Home Secretary (March 20, 1879), but were informed that, as the registration of deaths in England had always been associated with burial, cremation must first be approved by Parliament. Lack of funds compelled the society to intermit its labors for some time. In 1879 Dr. Fraser, bishop of Manchester, at the Social Science Congress, declared that cremation was "a subject which would have to be seriously considered before long, as cemeteries were becoming not only a difficulty, an expense, and an inconvenience, but an actual danger." An address, numerously signed, was brought before the [illegible]tish Medical Association in 1880, urging govern[illegible] not to oppose the practice of crema- and c[illegible]ending it to the public until some bet- [illegible]roc[illegible] rapidly resolving the body into its com- [illegible]s should be devised. In 1882 the ques- [illegible]on was brought before the High Court [illegible]e case of Williams *vs.* Williams, where her brother, executor of Henry [illegible]21, expenses incurred in carrying [illegible]ressed desire that his remains should be cremated. By a codicil to his will the testator directed that his body should be handed to her to be burned in accordance with instructions contained in a letter, and that his executors should pay her the expenses incurred. The body was buried, but Miss Williams obtained a license for its exhumation, alleging her desire to remove it to another cemetery. She then removed it to Italy, where the cremation took place. Mr. Justice Kay dismissed the action with costs, ruling that there could be no property in the dead body of a human being; that a man could not dispose by will of his remains; that the executors were *primâ facie* responsible for the proper interment of the dead body, and after death had a right to its custody and possession; and that the license for removal had been obtained illegally. The opinion was also expressed that cremation in England was not legal according to the law of the country. Upon this decision the comment is made that it would be tried severely in the case of a testator favoring earth-burial whose executors were cremationists. It may be noted, also, that the Roman Catholic Church lent the act of Miss Williams its sanction by blessing the urn containing the testator's ashes at the second burial.

On the 8th and 9th of Oct., 1882, the bodies of the wife of Capt. Hanham and of his mother, Lady Hanham, wife of the late Sir James Hanham, Bart., of Dean's Court, Dorset, were cremated there. These ladies died in 1876 and 1877 respectively, and their bodies were burned in the encasing coffins of wood and lead. Though the apparatus was most simple, the coffins being placed on iron plates and fire-brick above the furnace, a chimney 22 ft. high furnishing the draught, the process was successful in every respect. The time occupied was two hours. It may be added that it is recorded that in 1769, in obedience to the directions given in her will, the body of a Mrs. Pratt, of George Street, Hanover Square, was "burned to ashes in the new burying-ground adjoining Tyburn Turnpike;" and that about 1844 the sanction of the authorities of the city of London was obtained for the cremation, within the city of London gas-works, of the dead of Bridewell Hospital. In 1878 a crematory was erected, under the influence of Sir Henry Thompson, at Woking, in Surrey, and here, by 1889 forty human bodies had been consumed. Cremation having been declared legal in England, this mode of disposing of the dead is likely to advance.

Upon the Continent of Europe cremation has advanced much more rapidly. The Hygienic Congress which met at Geneva in 1882 approved the practice, especially in the case of serious epidemics. Italy still leads in the movement. In July, 1882, there were in that kingdom twenty-two organized cremation societies, with about five thousand subscribing members, and five "propagating commissions." Two crematories were in practical operation at Milan, and three others at Lodi, Cremona, and Varese, and one in Rome. Since then there has been a large increase, over 1000 bodies having been cremated by 1890, while crematories have been built in several other cities than those named. The Gorini furnace has been the most favored. No serious opposition has been offered to the practice by the Catholic or Protestant clergy, and it is likely to grow in popularity on account of its economy and greater decency as compared with inhumation in the Italian cities. Garibaldi left an autograph letter expressing a wish that his remains should be burned on the island of Caprera, being wrapped in his red shirt

and laid on an iron couch upon a pyre of aromatic woods. As open-air burning is illegal, his wishes were not carried out, and the repugnance he expressed during his lifetime to being "roasted in an oven like a fowl" has confirmed his friends in their reluctance to employ scientific apparatus. Germany ranks next to Italy in the number of cremations performed and the attention paid to the general subject. Up to the fall of 1888 559 bodies had been burned at Gotha, where a crematory was erected in December, 1878. This is the only crematory in Germany, though the idea has met with some favor. According to the report of Consul Wharton, the charge for cremation is $37.50. The bodies are placed in zinc boxes and rolled upon trucks into the "oven," where air heated to 1400° Fahr. is employed. Nine hours of preliminary preparation are necessary, and two hours elapse ere the ashes are collected, the average weight of the residuum being four pounds in the case of a woman, and six in that of a man. The ashes are delivered from the furnace, which is an economical modification of the regenerative system of Dr. Siemens, of London; they are perfectly white, and no odor is perceptible. Bodies have been sent to Gotha from different parts of Germany, from Russia, from England, and even from America. The Catholic clergy have refused to sanction the process, but no objection is offered by Protestants or Hebrews. Cremation is not yet legalized in Dresden, though several bodies have been burned there. The Berlin Cremation Society sends the remains of its members to Gotha, charging a small monthly fee, like a "funeral club." The movement has made much progress among the intelligent and well-to-do, and the cost of the process as yet prevents it from becoming popular. In the event of pestilence or war, however, it is likely that resort will be had to cremation, some such apparatus being employed as the Küborn, which receives twelve bodies at once, and can dispose of more than 200 in twenty-four hours.

Elsewhere upon the Continent the cremation movement is in a yet earlier stage. France has a society under the presidency of M. Kœchlin-Schwartz, with some 400 members, among them several very eminent men. The government, however, has refused to sanction cremation, though in the eighth year of the Republic the prefect of the Seine issued a permit to the wife of Pierre François Lachèze, the *chargé d'affaires* at Venice, allowing the incineration of the remains of their son. This permit, of which she did not avail herself, was granted upon the ground that the last rites paid to the dead constituted a religious act, the method of performing which could not be prescribed by the authorities without violating the principle of freedom of opinion. Cremation has been strongly urged in Paris, in view of the crowded condition of its cemeteries, whose inadequacy to the needs of the population has become conspicuous. In March, 1882, the municipal council of Paris, by a vote of 58 to 5, declared in favor of optional cremation and the employment of furnaces to dispose of the débris of the dissecting-rooms, and in 1887 a crematory furnace was erected at Père-la-Chaise, which was first used Oct. 22, 1887. Another was built in 1888. Cremation has been legalized in at least some cantons of Switzerland, which possesses several vigorous societies, notably that of Zurich. Though in Austria the government has treated the representations of the advocates of incineration with official neglect, the sanitary authorities of Buda Pesth have declared in favor of legalizing cremation. In Denmark, Copenhagen possesses a large and powerful society, which expects, by undertaking to cremate bodies at a cost of $2, or even less, to popularize the practice, funerals being excessively expensive. The Dutch Cremation Society is large and thoroughly organized, and possesses ample funds, but its efforts to obtain a modification of the burial laws of Holland have as yet proved unavailing. The subject of cremation has also been discussed in Belgium, where there is an influential society with its headquarters at Brussels. In Japan, according to Miss Isabella Bird's *Unbeaten Tracks in Japan*, the practice of burning the dead has grown in favor most rapidly since the removal of the prohibition pronounced by the government out of deference to European prejudices, so that about 9000 bodies are cremated annually. The coffins are placed upon stone trestles above piled fagots, tall chimneys furnishing a powerful draught and carrying off all offensive odor. The cost of cremation is about $1. Simpler processes upon a much larger scale were adopted in 1882 to dispose of the remains of those who had perished in the epidemic of cholera.

Interest in the cause of cremation in America dates from the republication in New York, in January, 1874, of Sir Henry Thompson's paper. A cremation society was then planned in New York, but it was never fully organized and did no practical work. The movement, however, was taken up and carried on by Dr. F. Julius LeMoyne of Washington, Pa., who constructed at his own expense the first, and the most employed, furnace for cremation built in the United States. The furnace was of brick and firebrick, 10 feet long, 6 feet wide, and 6 feet high, enclosing a semi-cylindrical retort of fire-clay, the lid of which is accessible from the outside at the door of the furnace. Into this retort, after it has been properly heated from below, the body is thrust, the required degree of heat being obtained by means of a fan-blast, and the gases formed during the process of burning being carried off by a chimney. The first cremation conducted at this furnace took place Dec. 6, 1876, when the body of Joseph Henry Louis Charles, Baron de Palm, was burned in accordance with the provisions of his will. The body, which had been embalmed just after death, in May, 1876, when the performance of the funeral-rites by the New York Theosophical Society attracted no little attention, and was thus in a condition particularly favorable for incineration, was wrapped in a sheet saturated with alum, and the process of cremation was practically completed in two hours. The direct cost of the process was $7.04, forty bushels of coke being employed as fuel. Up to the present time some forty bodies have been cremated in the LeMoyne furnace, the most notable incinerations being those of Mrs. Benn Pitman, Feb. 15, 1878; of Dr. LeMoyne, Oct. 16, 1879; and of Dr. S. D. Gross, May, 1884. Soon after Dr. LeMoyne's death it was reported that the crematory was to be dismantled, but the report proved untrue, his trustees resolving, though he had left no directions in the matter nor any fund for keeping up the furnace, to maintain it for the accommodation of believers in "fire-burial." No body is received unless it is shown that death has occurred recently and from natural causes, references and certificates to this effect being demanded. Notice is required in advance, as the heating of the furnace occupies twenty-four hours. The process of cremation takes about two hours, but from twenty to twenty-four hours must be allowed to

elapse ere the retort is sufficiently cool to permit of the removal of the ashes. These weigh from five to seven pounds. The body is removed from the coffin before cremation, a sheet placed beneath it facilitating the operation. The fee charged is $45, which includes all the expenses from the time the corpse is received at the railroad station until the ashes, in a sealed metal receptacle, are delivered to the friends. The cases thus far recorded are too few in number to warrant the student of the subject in generalizing, but it may be said that of the persons desiring to be cremated several were American-born and several women; indeed this method of disposing of the dead seems to commend itself particularly to the feminine mind as obviating the loathsomeness of decomposition. In respect of religious belief generalization would be as unsafe, but the list includes impartially members of different Protestant sects, Free-thinkers, a Swedenborgian, and a Liberal Hebrew. Besides the cremations at Washington, there should be enumerated two or three incinerations of Americans dying in Germany, who desired their ashes to be sent home, and the case of Mr. C. F. Funch, a prominent shipping-merchant of New York, who, disliking the publicity attaching to the process in the United States, ordered in his will that his remains should be taken to Milan and burned, and the ashes subsequently interred at Copenhagen. In 1884 the trustees of the Le Moyne crematory resolved to confine its use to residents of Washington county, Pa., in which it is situated.

The New York Cremation Society (Rev. J. D. Beugless, Brooklyn Navy-yard, president), which was incorporated in March, 1881, and now contains about 150 members, may be called the most effective organization of its kind in the country, though from time to time the movement has provoked the formation of associations in other cities—notably in St. Louis and Indianapolis, and in various smaller places. Crematories now exist near nine cities of the United States. The members of the New York Society were instrumental in the formation of the United States Cremation Company, with the object of erecting in the vicinity of New York a crematory and columbarium of the most approved modern pattern. The building and apparatus were erected by the New York Society in 1884.

It may be added that a number of portable crematories, upon the system devised by M. Louis Creteur, of Brussels, were included in the outfit for the construction of Panama Canal, but do not appear to have used. In 1882 the principal of M. de Lesseps's company recommended the erection of permanent crematory furnaces along the line of the canal. A crematory has been erected in connection with the University of Pennsylvania at Philadelphia, where the bodies from the dissecting-room are burned: provision has been made for a similar furnace in the newest of the London hospitals.

In his pamphlet on cremation Dr. Le Moyne mentions two instances of incineration in America during the last century. The body of Henry Laurens, for some time president of the Continental Congress, was burned soon after his death at Charleston, S. C., Dec. 8 1792, and that of Henry Berry (or Barry), of [illegible]ty. in the same State, July 18, 1786. The [illegible]air, such as that upon which Shelley's [illegible]u, was [illegible]d to in these cases. In [illegible] Dr. Charles F. Winslow [illegible]ity, in a furnace built for the occasion, and removed as soon as the incineration was complete. The body, wrapped in a shroud, was laid upon an iron tray and pushed into the furnace, the process of cremation occupying two hours and a half. In November of the same year Julius Kircher, of New York, employed one of the furnaces of his factory in the cremation of the remains of his son, an infant, one week old. The body, weighing 7 pounds, was reduced to 2½ ounces of white ashes. Since then various other cremations have taken place, but the whole number in the United States is not yet large. Of recent years the prejudices against cremations has decreased, and there has been a considerable increase of interest in the subject throughout the country, and it is probable that the presence of a severe epidemic would be the occasion of introducing the practice where it is now unknown. The opposition on sentimental grounds is less pronounced, while hygienic arguments in its favor have been more widely accepted.

The recent literature of cremation is comparatively scanty. Excellent bibliographical lists will be found in the *Transactions* of the Cremation Society of England (London), Smith, Elder, & Co.); Dr. Edward J. Bermingham's book, *The Disposal of the Dead* (New York, Bermingham & Co., 1881); and Mr. J. E. Williams' *Cremation* (Pittsburg, 1883), should be mentioned among American publications; and the papers which Mr. John Storer Cobb, Dr. Charles A. Siegfried, U. S. N., Dr. Charles W. Purdy, of Chicago, and several other earnest students of the subject, have contributed to periodical literature, and the *Transactions* of medical and scientific societies merit collection and preservation in a more permanent form. Dr. Purdy in particular has dealt with the economical aspects of cremation in a novel and effective manner. (G. T. L.)

CRESSON SPRINGS, a health-resort in Cambria co., Pa., is on the Pennsylvania Railroad, 15 miles S. W. of Altoona, and at the junction of the Ebensburg and Cresson branch railroad. It is on the crest of the Alleghanies, 2200 feet above tide. The hotel accommodations are large and good. The three principal medicinal springs are called respectively the "iron," the "alum," and the "magnesia spring;" but all are ferruginous, the second strongly, and the third slightly so. The water of the alum spring is recommended as a tonic, and that of the magnesia spring as an aperient; while the iron spring is useful in certain diseased conditions of the kidneys and the mucous surfaces generally. A fourth spring is exceptionally pure, and is employed in nephritic and rheumatic cases, as well as for chronic diseases of malarial origin.

CRESTLINE, an incorporated village of Crawford co., Ohio, is at the intersection of the Pittsburg, Fort Wayne, and Chicago Railroad with the Cleveland, Columbus, Cincinnati, and Indianapolis Railroad, 60 miles west of Columbus. It has 6 hotels, 2 banks, 2 weekly newspapers, 7 churches, and 2 schools with good buildings. Its business and most important industries are connected with the railroads, which have large shops here. There are also two flour-mills, a saw-mill, and manufactures of furniture, wagons, carriages, etc. Crestline was settled in 1852, and incorporated in 1858. Its property is valued at $1,000,000; its public debt is $55,000. It has a park and good water-works. Population, about 3100.

CRESTON, a city of Iowa, in Union county, is on the Chicago, Burlington, and Quincy Railroad, 190 miles W. of Burlington. From this place a branch road runs south to St. Joseph and Kansas City, and another north to Sioux City. The roundhouse and machine-shops of this road are also here, and extensive

stock-yards. The city is lighted with gas, has a telephone exchange, water-works, and a fire department. It has 3 banks, 1 daily and 3 weekly newspapers, 6 churches, and good schools. It has also 2 flour-mills, 3 grain-elevators, and other industries. It was laid out in 1869 and incorporated in 1871. Population, 7119.

CRIMINAL LAW. Crime is an act committed or omitted, in violation of public law, either forbidding or commanding it, and criminal law is that special form of procedure which has exclusive jurisdiction over such offences. Criminal law provides for the trial of persons charged with criminal offences, defines crimes, and prescribes the punishment to be inflicted on conviction. It inflicts punishment upon the body of the guilty, whilst civil law punishes the offender by the means of damages commensurate with the injury done.

See Vol. VI. p. 520 Am. ed. (p. 587 Edin. ed.)

The criminal codes both grade and classify crimes. The grades are felony and misdemeanor. Felony consists of treason, murder, arson, burglary, robbery, rape, sodomy, mayhem, and larceny. Misdemeanor comprises all offences, lower than felonies, which may be subjects of indictment. Misdemeanor is divided into two classes, *mala in se* and *mala prohibita*. *Mala in se* ("evils in themselves") are such as mischievously affect the person or property of another, or openly outrage decency, disturb the public order, are injurious to public morals, or are a breach of official duty, when done corruptly. *Mala prohibita* ("evils forbidden") are of two sorts. The first consists in the commission or omission of any act enjoined or forbidden by statute, though by such statute such omissions or commissions are not made the subject of indictment; secondly, those which consist of the omission or commission of any act which by itself is made specially indictable.

Proceedings under the criminal law are commenced by indictment, or a written accusation of one or more persons of a crime or misdemeanor presented to and preferred upon oath or affirmation by a grand-jury legally convoked. To render an indictment valid there are certain essentials and requisites, viz., the indictment must be presented to some court having jurisdiction of the offence. It must be found by the grand-jury of the proper county. It must be found a true bill, and signed by the foreman of the grand-jury. It must be framed with sufficient certainty—that is, it must contain a certain description of the crime or misdemeanor of which the defendant is charged, and a statement of the facts by which it is constituted, so as to identify the accusation; it must be in the English language, and be certain as to the name of the defendant charged with the crime, for a misnomer is fatal to the indictment. So jealous is the law of the liberty of a citizen that unless the above requisites are strictly complied with, no man can be put in jeopardy of his life or liberty.

Criminal law has peculiar and exclusive jurisdiction over the following offences: (1) Offences against religion, as blasphemy and disturbing public worship. (2) Offences against the State, as treason and misprision of treason, counterfeiting or impairing the current coin. (3) Against public justice, bribery, perjury, prison-breaking, rescue, barratry, maintenance, champerty, extortion, suppressing evidence, neglect or misconduct of officers, obstructing legal process, and embracery. (4) Against public peace and trade, as challenges to fight a duel, riots, affrays, and libels. (5) Against chastity, decency, and morality, as sodomy, adultery, incest, bigamy, fornication, drunkenness, and violating the grave. (6) Against public police and economy, as common nuisances, idleness, vagrancy, and beggary. (7) Against public policy, as gambling and illegal lotteries. (8) Against the private property of individuals, as burglary, arson, robbery, forgery, larceny, receiving stolen goods, knowing them to have been stolen, and malicious mischief. (9) Against individuals, as homicide, mayhem, rape, poisoning with intent to murder, abortion, assault and battery, kidnapping, false imprisonment, abduction, and conspiracy. The penalties attached to the conviction of any person or persons are regulated and prescribed by the various statutes of the several States, and are generally in the nature of fine or imprisonment, or both, infliction of which is usually left to the discretion of the court.

The power of pardoning a criminal, in most of the States, is vested in the executive or governor, at whose discretion a person may be released from his sentence and restored to liberty and citizenship; in other States the power is vested in the Criminal Court; but in Pennsylvania the power is vested by the Constitution of 1874 in a Board of Pardons, composed of the Lieutenant-Governor, Secretary of the Commonwealth, and Attorney-General and Secretary of Internal Affairs, upon whose favorable recommendation in writing alone can the Governor issue a pardon, as is also the custom or law in the State of Massachusetts. In the several States the doctrine of the English common law is incorporated in the statute laws, as to the classification of the crime and its effects, but the punishment has been made a matter of special statutory enactment. (F. H.)

CRISIS, COMMERCIAL. Commercial crises are serious troubles in a system of exchange based on credit. During periods or in countries where credit is not employed, commercial crises are unknown; they have become frequent and serious in the present century, and have occurred most often in England, the United States, and in the north-west of the European continent; that is to say, in those lands where credit has to a great extent taken the place of metallic money.

Crises are sometimes acute, as those of 1847 and 1857, but not prolonged; sometimes they are persistent, as in 1873–1879. If we may compare these diseases in currency to those of the body, we might say that the first are of an inflammatory character, while the second resemble an anæmia. There are three sorts of crises: 1. Commercial and monetary crises. 2. Industrial crises. 3. Stock-exchange crises or *Krachs*. Although possessing many common features, they differ sufficiently to bear being separately studied.

I. COMMERCIAL AND MONETARY CRISES.—*Their Character.*—Since the regular recurrence of crises it has been remarked that there are three periods in their development: the period of preparation, the period of expansion or "inflation," and that of contraction or revulsion. During the period of preparation industry is active, commerce healthy, and the production of wealth abundant and regular. New capital is formed from savings. This is employed in the cultivation of fresh soil, in opening up new territory or mines, in furnishing industry with more highly perfected machinery, or establishing further means of communication between towns or countries by railways and steamboats, or, again, in building houses in towns or villages. Economic progress is thus calmly and evenly accomplis'ed; nevertheless, in those lands where science,

rendering work productive, rapidly multiplies wealth, the latter does not at once find remunerative employment. It accumulates in banks as deposits, or is offered on the money-market seeking good investments. The supply of capital is in excess of the demand, and the rate of discount falls. When money is to be obtained cheaply, a great many enterprises become possible which were not so previously. If by paying an annual interest of 2 or 3 per cent. the use of a capital of $100 may be obtained, any investment bringing in 4 or 5 per cent. is a temptation to enterprising characters. Capital calls forth the spirit of enterprise, and the latter moves with greater or less activity, at times even becoming feverish. The period of expansion then commences. There is generally one sort of enterprise which is looked upon as the most advantageous and which absorbs public attention; for example, the colonisation of the Mississippi, as in the time of Law, in France; the mines and exports of goods to the then recently liberated Spanish colonies, as in England in 1820–1825; or the railway mania, commencing in England and America in 1843–1847, and again in 1857.

The public is persuaded that these undertakings will bring in immense profits, and the shares representing them are sought for. These shares, of course, rise in the market, and those possessing them make money. As the rise continues, it is concluded that it suffices to purchase to obtain part of the profits. All spare capital is invested in the enterprise which enjoys such general favor. The more abundant the capital, the greater the rise. Who would not buy to-day with the assurance that he can sell to-morrow with profit? Why not thus enrich one's self without trouble, calculation, or risk? The circle of buyers increases ceaselessly; sometimes, as in the days of Law, it embraces all classes of the population. In such a case speculation becomes an absolute infatuation. The shares rise to fancy prices. But the result produced does not stop there. Those who have realized profits place their gains elsewhere; they invest in other values which, in their turn, rise in the market. Others prefer at once to enjoy their newly acquired wealth. They order fine furniture, elegant clothing, and commence spending lavishly. Goods in general, being more sought after, rise in price. Tradesmen and importers make money, and, in their turn, spend more freely. Fresh enterprises being started on all sides, products of all kinds are needed to advance them; machinery, vessels, wagons, rails, tools, all rise in price, and the manufacturers realize large profits. In order to execute the orders which pour in from all sides, more workmen must be employed; this demand for extra hands raises the rate of wages. Workmen, better paid, spend more, and colonial produce, groceries, and manufactured goods rise also in price, and those who manufacture or sell them make money and consequently spend more lavishly. In short, a general inflation in prices, a general growth in profit takes place; economic activity becomes overstrained. The employment of credit favors to a considerable degree this expansion and over-excitement. More is bought and at higher prices. Exchanges being more numerous and the articles exchanged of greater value, there must be more means for effecting them.

When metallic money is very plentiful, a similar effect is produced; but since in this case the edifice is founded on a solid basis, that is to say, on real merchandise, there is no danger of its falling. The use of credit is, on the contrary, most dangerous, for it is based on a very fickle sentiment, *confidence*. Speculators who purchase shares, tradesmen buying goods, manufacturers purchasing raw materials or increasing their factories, operate not only with the cash they have at their disposal but with capital borrowed from banks. Further still, they buy, promising to pay, and they count on the profits they will make on the sale of their purchases to be able to do this. They obtain credit because they are trusted, and it may be that they are in point of fact generally solvent. Only by this promise they involve capital which cannot be, properly speaking, employed as a means of purchase, houses, lands, factories, which represent a value superior to the engagements they have entered upon, but which could not be immediately realized upon on the bills falling due. So long as confidence lasts and promises can be renewed, the accelerated economic movement continues. Nevertheless there is great want of proportion between the engagements undertaken and the means at hand to meet them.

The rise in the value of the principal shares cannot last indefinitely. There comes a moment when the public begin to reflect and men ask themselves, "Is what I am buying worth the price I pay for it?" This reflection is the key-note of a series of difficulties and disasters. Often an unfortunate event, a bad harvest, for instance, is the signal for the return movement; sometimes a simple change in the ordinary aspect of commercial affairs suffices. So long as the rise is believed in, without any limit being fixed, the intrinsic value of the shares does not signify; no one reflects on it; all are persuaded they will sell with profit. But as soon as a doubt arises and hesitation becomes manifest, every one seeks shelter. The number of sellers exceeds the buyers and the shares begin to fall. Some few efforts are made to stop them at the onset, but they are ineffectual, confidence is lacking, and soon the shareholders insist on realizing at any price. The fall then becomes more rapid than was the rise. Sometimes it is even a sudden collapse. No one will buy because there is no foreseeing how low the value may fall. I purchase to-day, and find to-morrow that what I bought is worth less than the price I gave for it. Nevertheless, those who have entered upon engagements must fulfil them, and they sell for the price they can obtain. Then commence bankruptcies. These begin with those houses the most deeply involved in speculation, or where the state of affairs was previously more or less compromised. But soon more stable firms are threatened or even forced to suspend their payments, because their creditors are unable to pay them. The commercial world of the present day forms a huge chain; if one of the links be snapped or broken the entire chain feels something of the shock.

Credit was the means of exchange and payment employed by all, but, in these moments of crisis, distrust is spread abroad and rightly so, for there is no knowing who will hold out against the tempest. The bounds of credit become far more limited and it is even refused entirely.

Before the crisis promises were in excess of the available means of payment. The latter are now wholly inadequate, a portion having altogether ceased to exist. Bank deposits are withdrawn, bills of exchange refused, and thus not only are money and bank-notes hoarded to meet the urgent necessities of the time being, but many credit instruments serving as circulating mediums are not renewed. It is easy to conceive what must be the result of such an accumu-

lation of circumstances. Every one wishes to sell, no one to buy; every one to borrow, no one to lend. The means for effecting exchanges ought to be increased. They are diminishing, and even metallic money is withheld from circulation. The demand for capital is pressing, even violent; men will have money at any cost: they *must* have it to fulfil their engagements and escape failure. Regulating banks, for the protection of their reserve, suddenly raise the rate of discount from 4 or 5 to 9 or 10 per cent.; 20 or 30, and sometimes, on specially dark days, 40 or 50 per cent. is asked by private bankers. The panic now reaches its height. Failures and suspensions of business may be counted by hundreds and thousands. Economic life is at a standstill because exchange, the principal wheel of the whole machinery, is stopped.

This sharp period of the crisis is not of long duration. By-and-by the panic ceases. Capital, attracted by the extreme cheapness of all securities and of goods in general, reappears on the market. Buyers also offer, and thus, little by little, prices rise. Demands for advances lessen and banks are thus enabled to lower their rate of discount. At the end of a few months, economic life has resumed its normal aspect. But industry, which has been severely attacked, suffers longer. Workmen have been discharged and the wages of those kept in employment reduced. The majority of trades suffer indirectly; there comes a reaction. It takes some time for this depressed state of affairs to right itself. This is the period of recovery. Two or three years of peaceful calm and prosperity follow, during which time the elements of a fresh crisis accumulate.

Periodicity of Crises.—The almost regular return of crises at an interval of about ten years has led to their recurrence being attributed to a sort of law similar to that which governs cosmic phenomena. A well-known English economist, Stanley Jevons, endeavored to associate the advent of crises with that of the spots which have been remarked on the sun. Mr. Jevons pretends that the crises are induced by bad harvests, and that bad harvests are caused by certain periodical modifications of the solar photosphere. All the physical phenomena observed on our planet depend in so great a degree on the action of the sun, that economic events might also be subject to the same influence; only crises are not always due to bad harvests. The link to connect them with the spots visible on the sun is therefore wanting.

The periodicity of crises is very simply explained by the series of facts we have already analyzed. It takes several years of prosperity for the elements of a crisis to be formed. Then the period of expansion occupies also two or three years. Add a similar time for the period of embarrassment and recovery and we reach a total of ten or eleven years, the space which has elapsed between the crises which have taken place during the last century. The following are the dates of the commercial crises really worthy of the name: 1763, 1783, 1793, and 1797, 1825, 1837–1838, 1847, 1857, 1864–1866.

It is well to remark that these dates refer to crises that have occurred in England. Other countries, as for instance the United States and France, were seriously affected by only one, that of 1857. It would be rather singular if the spots on the sun affected England alone!

Men are disposed to find in events those *corsi* and *ricorsi* of which Vico speaks; this flux and reflux which is, according to ancient philosophers, the rhythmical law of the universe; but the decennial cycle of crises is far from being an acknowledged fact. Economic disturbances are of frequent occurrence, and it is only by making some among them stand out in bold relief that the decennial period can be fixed upon. According to some authors there were crises in all the following years: 1793, 1795, 1797, 1810, 1811, 1816, 1825, 1832. 1837, 1839, 1840, in the spring of 1847 and the autumns of 1857, 1864, and 1866. In his celebrated speech on the Currency bill, Sir Robert Peel mentions three great monetary crises as having taken place, viz.: one in 1825, another in 1832, and a third in 1837–39. Mr. Tooke, on the other hand, entirely ignores those of 1832 and 1839, and even as regards the years 1836 and 1837 he maintains that the money-market difficulties at that time were not sufficiently serious to be designated as "commercial crises." The notion of a periodical, or I may say fatal, return of crises is contradicted by an attentive study of these phenomena, for they are brought about each time by wholly different and purely accidental circumstances. Only as Mr. Cliffe Leslie observes in some letters to the *Economist* (19th and 20th November, 1864) if this idea were to take root in the business world it might be productive of most unfortunate results and thus realize the predictions of the cycle theorists; for a belief in a decennial crisis would tend to produce one at the appointed time as a result of the false alarm, or would induce one at another moment from over-confidence in the non-existence of danger.

Theory and Causes of Crises.—Mr. Macleod, in his *Dictionary of Political Economy*, under "Commercial Crises," explains their causes as follows:

"*First.* A long-continued very low rate of interest. Persons in such times who have nothing but the interest of small capitals to live on are so strained in their means that they look out for more profitable investments. At such times wild speculators are sure to abound to take advantage of the credulous. One scheme breeds another, and a speculative fever seizes upon the public like a mania. Multitudes of schemes are set afloat for no other purpose than gambling in the shares. Numbers of persons then rush to buy the shares merely for the sake of selling them again, knowing full well that a crash must come, but hoping to make a lucky hit during the fever. Then, at last, either when calls come, supposing them ever to get to that stage, or when the circle of dupes is found to be exhausted, prices begin to waver and every one rushes to sell, and of course things fall as rapidly as they rose, and then comes the crash.

"*Secondly.* When some new, large market is opened at home or abroad, in which extraordinary gains are realized by the first adventurers, numbers then rush in and over-production takes place, and the herd of adventurers is ruined.

"*Thirdly.* A great and general failure of some great crop necessary for subsistence. The enormously increased price deranges the demand for other things; the sudden rise of price tempts great speculation, sure to be followed by enormous disasters.

"*Fourthly.* A great derangement of the ordinary course of trade from some great general cause, such as the sudden commencement or the sudden termination of a war. The sudden cessation of demand for some articles deranges the calculations of the producers of them, and the sudden demand for large quantities of others raises their price suddenly, and gives rise to

immense speculations in them, which are sure to be overdone and end in general ruin.

"Each of these causes separately, if on a sufficient scale, may produce a commercial crisis; but, as several of them may happen together, it will, of course, be proportionably intensified."

In my opinion, Mr. Macleod enumerates the principal reasons for crises, but does not indicate how they are prepared. I consider that, for a true commercial and monetary crisis to break out, the three following causes are necessary:

1. The general use of credit as a means of exchange.
2. The existence of an excessive number of long-term engagements.
3. A contraction of the metallic basis of credit through the absorption of money in interior channels of circulation, or its being exported to foreign lands under the influence of an opposite balance.

The first two causes prepare the elements of the crisis, the last one determines it. Let us examine the three causes more closely.

First. In western countries, and especially in England and the United States, exchanges are effected in far more cases (90 per cent.) by the employment of credit than by the use of metallic money. Doubtless, in retail sales and purchases—which are by no means unimportant, though but little account is taken of them—metallic money is usually employed; but at the same time it is certain that nine-tenths of the important business transactions are treated on the credit system, bills of exchange, cheques, bank deposit, letters of credit, promises, etc. All these credit instruments are, in point of fact, promises or orders to pay certain stipulated sums in cash. If depositors were to withdraw their deposits from the banks, or if the holders of notes wished to convert these into coin, it would be at once seen that it would be a matter of impossibility to fulfil the engagements entered upon. Banks circulating bank-notes could no more pay them than could ordinary banks the deposits confided to them.

The immense edifice of credit rests on a metallic basis, and this basis is reduced to a minimum by banks, to whose interest it is to allow no capital to lie idle, and also by individuals who prefer paper-money to silver or even gold. Strictly speaking, we might say that the whole commercial world is in a constant condition of latent bankruptcy; for the means of payment at its disposal are wholly insufficient to meet the number of engagements contracted. Bagehot, Newmarch, and nearly all economists who have studied the fluctuations of the universal money market, are of opinion that cash is too much economized, for any noteworthy disturbance in the equilibrium of international exchanges suffices to induce an embarrassment which may degenerate into a crisis if it fall on a market overcharged and far other than steady. This danger has increased since the calling in of silver has led civilized people to contend for the only metal which now enjoys international circulation—viz.: gold. The disturbances and anxieties which agitated the money markets of the European continent, after the exceptional exports of gold to America in 1880–81, are sufficient proof of this instability.

Secondly. The second cause of the preparation of c[illegible]s is the existence of a great many long-term en[illegible]nts. It is quite certain that if all purchases of [illegible]s or of goods were paid for in cash, or, at all [illegible]. if the means of payment were always available, [illegible] would not so often entail crises; but, as we have already seen when studying the characteristics of crises, during the period of expansion shares for many undertakings are issued and subscribed for, ready-money payments not being exacted; for, as a rule, only a portion of the capital is considered requisite when an enterprise is started. Shares and goods are purchased at high prices, and for credit, in the hope of realizing a profit later on their sale. When these term purchases become feverish, and the general infatuation induces an immoderate rise in values, the elements of a crisis may be said to exist on the market. This bursts forth on the production of the third cause.

Thirdly. The third cause is any event, either favorable or the reverse, which induces an important change in the market and leads to an absorption of cash either through the ordinary channels of circulation or through being exported abroad. The two crises of 1763 and 1783 were each time the result of the conclusion of peace. That of 1825 was induced by an excess of foreign investment; that of 1847 by the necessity to purchase corn abroad; that of 1857, which commenced in the United States, by the necessity to pay exceptional importations; those of 1864 and 1866 by the purchases of cotton in the Indies, instead of, as previously, in the United States. Large sums in silver were then, of course, obliged to be sent to the East. As Newmarch says, monetary pressure is sufficient to determine a crisis when the elements of it already exist, because a rise in the rate of discount takes place. This rise produces a double effect—one direct, the other indirect: direct, in that it diminishes the margin of profits for silver; indirect, in that it shakes confidence. Thus the rapid expansion movement which prepares crises, the rise in prices and the excess of employment of means of credit is founded entirely on the confidence in an ulterior rise. Shake this confidence and the advance movement comes to a stand-still; the period of revulsion commences, the reflow becomes more marked; and then, if the market has been overstrained, a panic ensues and catastrophes multiply. The history of crises which we will briefly sketch is proof sufficient of the truth of these observations. Each of these disturbances was determined by the export or absorption of cash.

Monetary Contraction Crises.—These crises are quite different from those we have just analyzed. They have been less carefully studied, for, their action being almost imperceptible, they do not attract public attention, and are, indeed, denied by the majority of economists. The following is a diagnostic of this sort of crisis. When, for a local or general cause, the instrument of circulation is reduced or does not increase in proportion to the requirements of exchange, a slow but continuous fall in prices ensues. Debtors and all who are engaged in trade and industry lose through this fall in prices, and these repeated losses stop the impetus of business and paralyze economic movement. This sort of crisis has been nowhere better described than in the report addressed to the Senate of the United States, March 2, 1877, by the Monetary Commission of 1876. I think it useful to give some few extracts here:

"*Effects of a Shrinking Volume of Money on Productive Industry.*—The worst effect, however, economically considered, of falling prices, is not upon existing property nor upon debtors, evil as it is, but upon laborers whom it deprives of employment and consigns to poverty, and upon society, which it deprives of that vast sum of wealth which resides potentially in the vigorous arms of the idle workman. A shrinking volume of

money transfers existing property unjustly, and causes a concentration and diminution of wealth. It also impairs the value of existing property by eliminating from it that important element of value conferred upon it by the skill, energy, and care of the debtors from whom it is wrested. But it does not destroy any existing property, while it does absolutely annihilate all the values producible by the labor which it condemns to idleness. The estimate is not an extravagant one that there are now in the United States 3,000,000 persons willing to work, but who are idle because they cannot obtain employment.

"Money capital, labor, and other forms of capital are the warp and woof of the economical system. Labor, co-operating with the forces of nature, is the source of all wealth, and, to reach the highest degree of effectiveness, it must be classified through the aid of capital and supported by capital during the process of production and be measured and paid in money, each unit of which is a sight-draft on all other forms of property, bearing a value in proportion to the number of such drafts. In order that any country may reach the maximum of material prosperity, certain conditions are indispensable. All its labor, assisted by the most approved machinery and appliances, must be employed, and the fruits of industry must be justly distributed. These conditions are utterly impossible when the money-stock is shrinking and the money-value of property and services is declining. Howsoever great the natural resources of a country may be, however genial its climate, fertile its soil, ingenious, enterprising, and industrious its inhabitants, or free its institutions, if the volume of money is shrinking and prices are falling, its merchants will be overwhelmed with bankruptcy, its industries will be paralyzed, and destitution and distress will prevail.

"Other forms of capital must be constantly converted into money in order to pay wages and to meet other demands incident to industrial enterprises. When the stock of money is shrinking and prices are falling, this conversion can only be made at rates continually growing more unfavorable, while at the same time the products of the labor for whose wages sacrifices have been made are also undergoing a shrinkage of money-value. Thus loss and sacrifice are encountered at every turn, and the owners of other capital than money shrink from the friction of exchange, withdraw from productive enterprises, and only exchange as much of their property for money as will suffice to meet the necessary expenditures of living, which are reduced to the most economical level, as it is principal, and not income, which is being consumed. Little more labor will be employed under these circumstances than is sufficient to support the owners of capital on this parsimonious basis; and, as a consequence, the labor market will be overstocked, and the competition between laborers will reduce wages to a starvation level. But during this period, when property is being sacrificed to meet current necessities, and laborers are being remitted to idleness and destitution, money fattens on the general disaster. Under an unjust money-system, under a system which, through law or accident, fails to regulate the quantity of money so as to preserve the equilibrium between money and the other factors of production, the conflict between money and labor and other forms of capital becomes destructive and ruinous. It is in the shadow of a shrinking volume of money that disorders, social and political, gender and fester; that communism organizes; that riots threaten and destroy; that labor starves; that capitalists conspire and workmen combine; and that the revenues of governments are dissipated in the employment of laborers, or in the maintenance of increased standing armies to overawe them. The peaceful conflict which under a just money-system is continually waged between money-capital and labor, and which tends only to secure the rights of each, and is essential to the progress of society, is changed under a shrinking volume of money to an unrelenting war, threatening the destruction of both.

"The very same reasons which make capitalists refuse to exchange money, whose command over property is increasing, for property, whose command over money is decreasing, also make them refuse to exchange it for labor for the production of property. In a commercial sense, industrial enterprises are never undertaken nor carried on, except with the hope and expectation of gain. This expectation, unless under exceptional conditions, falling markets destroy. While capitalists, for these reasons, cannot afford to invest money in productive enterprises, still less can anybody afford to borrow money for such investments at any rate of interest, however low, and but little money is being now borrowed, except for purely speculative ventures, or to supply personal and family wants, or to renew old obligations. Money withdrawn from circulation and hoarded in consequence of falling prices, although neither paying wages, nor serving to exchange the fruits of industry, nor performing any of the true functions of money, is nevertheless not unproductive. It may not be earning interest, but it is enriching its owner through an increase of its own value, and that, too, without risk, and at the expense of society. If this were not the case, and if money were, while idle, losing a little in value instead of gaining, or if it simply held its own, it would be constantly diminished to the extent of the necessary expenditures of its owners, who, under such conditions, would be impelled by every instinct of thrift to seek for revenue through its employment in productive enterprises. The peculiar effect of a contraction in the volume of money is to give profit to the owners of unemployed money, through the appreciation of its purchasing power, by the mere lapse of time. It is falling prices that robs labor of employment and precipitates a conflict between it and money capital, and it is the appreciating effect which a shrinkage in the volume of money has on the value of money that renders the contest an unequal one, and gives to money capital the decisive advantage over labor and over other forms of capital invested in industrial enterprises. Idle machinery and industrial appliances of all kinds, instead of being productive of profit, are a source of loss. They constantly deteriorate through rust and waste. They cannot escape the assessor and tax-gatherer, as the bulk of money does, and must pay extra insurance when idle. Labor, unlike money, cannot be hoarded. The day's labor unperformed is so much capital lost forever to the laborer and to society. It being his only capital, his only means of existence, the laborer cannot wait on better times for better wages. Absolute necessity forces him to dispose of it on any terms which the owners of money may dictate. These are the conditions which surround the laborer throughout the commercial world to-day. The labor of the past is enslaving the labor of the n
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present labor and over all forms of property, and to transform vast numbers of honest and industrious workmen into tramps and beggars. These laborers must make their wants conform to their diminished earnings. They must content themselves with such things as are absolutely essential to their existence. Consumption is therefore constantly shrinking toward such limits as urgent necessities require. Production, which must be confined to the limits indicated by consumption, is constantly tending toward its minimum, whereas its appliances, built up under more favorable conditions, are sufficient to supply the maximum of consumption. Thus idle labor, idle money, idle machinery, and idle capital stand facing each other, and the stagnation spreads wider and wider."

Industrial Crises.—These are always produced by an excess of production in the industry which the crisis affects. The price of an object is raised from excess of demand. At once all available capital and enterprising people turn in this direction. Numerous new factories and works are opened for the manufacture of the product so sought after, and the result of this excessive production is a glut in the market. A crisis breaks out. The less important factories succumb, and finally the balance is re-established. These crises are particular to one or another branch of trade. But when they attack an important branch as, for instance, metallurgy, the reaction may affect others and lead to a general disturbance.

Stock Exchange Crises or Krachs.—The German word *krach* (crash) was first employed to designate stock exchange crisis after the one which occurred in Vienna in 1874 at the close of the International Exhibition which took place that year in the Austrian capital. They have been called "bubbles" in England since 1720, because the companies then formed for trading in the Southern seas increased rapidly, like soap-bubbles only to collapse and disappear, leaving no trace of their presence. We can sketch this phenomenon in a few lines. The public generally are strongly in favor of a certain sort of enterprise, the shares which represent it are much sought after, the price of them rises higher and higher, until a moment is reached when the rise is no longer believed in, and then all falls through. The enchanted palace created by fata morgana fades away. Nothing real has been destroyed, but the sharp men have made money and innocent enthusiasts are ruined.

History of Crises.

A rapid glance at the history of crises will ratify our theories, but here again we will keep to the divisions we have adopted:

I. *Commercial and Monetary Crises. Crisis of* 1763.—The termination of hostilities in 1763 brings about a sudden change in the situation of commerce. Thirty important houses in Amsterdam and sixteen in Hamburg become bankrupt. Mistrust in England is general and cash alone is accepted for payments. Business is suspended for lack of means of exchange. Adam Smith speaks of this crisis and says that the bank considerably diminished its intensity "by supporting the merchants to upwards of a million," advancing them one million sterling.

Crisis of 1783.—The close of the war with the Americes rise to extraordinary commercial ac- The bank raises its issue from to £9,600,000 in March, 1782. The drainage of gold commences, and continues until October, when the specie is reduced to £473,000. Following the advice of Bosanquet, one of the directors, the bank acts by a violent revulsion. A crisis ensues but gold is recalled, and soon afterwards credit recovered.

Crisis of 1793.—A period of great prosperity shortly commences. The treaty of Eden with France (1783) establishes freedom of navigation and almost free trade. Commerce spreads rapidly.

	Imports.	Exports.
1782.....	£10,341,628	£13,009,438
1792.....	£19,659,358	£24,905,209

County banks multiply on all sides. It is estimated that there were 50 in 1750 and more than 400 in 1792. In the midst of this impetus commences the dispute with France and the declaration of war (1793). The panic is now at its height. There are bankruptcies on all sides. Gold is hidden and refused. A committee of the House of Commons declares that some remedy must be discovered, that the discredit of county banks is inducing the hoarding of gold, and that there is such a lack of means of exchange that a general stoppage is imminent. A bill creates £5,000,000 in *Exchequer bills* which are advanced to trade. Contemporary authors remark the effect of this measure as extraordinary. Confidence at once returned and gold reappeared. Business transactions recommenced. It was a case of gold being interiorly absorbed.

Crisis of 1795 *and* 1797.—In 1794 the situation is favorable, but Pitt commences paying subsidies to Continental armies to aid them to carry on war against France. Gold leaves the country very fast after the month of May, 1795. In addition to this, country banks, whose notes do not circulate very freely, obtain their gold from the Bank of England. In December, 1796, the specie of the latter is reduced to £2,508,000. The drainage of gold assumes more alarming proportions, especially during February; on the 25th of that month the specie is reduced to £1,272,000. Credit is dead. To obtain resources people sell at any price. Three per cents. fall to 51. An order from council suspends payments. A general feeling of relief is the result of this. The bank, in one week, increases its advances to £2,000,000; 4000 city houses unite to prevent the bills being dishonored; bank notes for £1 and £2 are issued, and Spanish piastres are admitted as legal tender and their value fixed at 4*s.* 9*d.* The crisis decreases, and, under the influence of enforced notes, business gradually rights itself.

Crisis of 1810.—After the year 1806 a period of expansion commences. Numerous companies are formed for breweries, canals, factories of all kinds. 720 county banks send £30,000 in bank notes into circulation, and the Bank of England raises its advances from 3,000,000 in 1808 to 20,000,000 in 1810. The remaining gold flows towards the continent. J. B. Say estimates that smuggling took £9,000 to Belgium in a very short space of time. The paper sovereign rapidly depreciates. In 1813 it is worth but 14*s.* 2*d.* In 1815 a crisis was produced through excess of speculation; country banks were the special victims in this case; 240 of them suspended payment.

In November, 1816, the Bank of England announces she will reimburse notes in gold, but during the whole of 1818 corn and goods are largely imported at high

prices, the rate of exchange becomes unfavorable and gold drains away. The specie of the bank in November has fallen to £5,000,000 sterling. From this monetary pressure results a contraction of credit, a fall in value, and considerable losses on the imported merchandise. Hence failures and a crisis. The reimbursement of notes is again suspended.

Crisis of 1825.—This crisis was far more severe than any previous ones. It is remembered in England as the earthquake at Lisbon in Portugal. The fire of London could not have left a deeper impression. A period of unexampled prosperity commenced in the year 1822. The money market was overrun with funds. The bank specie rose to £12,000,000 sterling. In November, 1824, consols were at 96. General attention was turned to the new States which were being formed in America, provinces of recently emancipated Spanish and Portuguese colonies. Immense quantities of merchandise were sent out there, and large amounts of capital were employed in mines, whose shares reached fabulous prices. At the same time, in England itself, many companies were formed for the advancement of different trades and industries; the shares of these were also greatly in request. A speculative spirit was upon all classes, and every one seemed to make money. The prices of most goods increased considerably, and a great deal of merchandise was imported from abroad. This had to be paid for, and an unfavorable rate of exchange ensued. The drainage of gold commences toward the close of 1824, and continues through 1825. In December of that year the bank specie is reduced to a million sterling, and in spite of this the rate of discount was not raised from 4 to 5 until the 17th of December, when the crisis already threatened. Credit was suddenly withheld. Every one wished to sell to secure resources. The prices of goods fell 30 or 40 per cent. There was a run on the banks, and more than 80 were obliged to suspend. Mistrust was general. Factories closed and the workmen without work ransacked the machinery. Despair reigned. What was wanting was a means of payment, that which makes credit having almost entirely disappeared. The bank sent into circulation all available notes. The banker, Baring, Lord Ashburton, relates in his book, *Financial and Commercial Crises Considered*, that a bundle of a million and a half bank notes of £1 found by accident and immediately made use of were productive of great relief. The month of January, 1826, was nevertheless hard to battle through, and on the whole there were many very heavy losses.

In New York the same year there was a similar crisis. In the spring abundant means, unlimited credit, fresh undertakings entered upon, goods bought, speculations chiefly on cotton. In the month of July metal disappears from banks, the instrument of exchange becomes rare, and credit is less readily given and obtained. Discount rises from 20 to 30 per cent. Prices lower during the month of August, and failures commence. The crisis then breaks out in all its rigor.

Crises of 1836, 1837, *and* 1839.—In the spring of 1836 the period of expansion is at its zenith. Railway companies and county banks are started to the number of 670. But, in America, Pres. Jackson counsels an increase of circulation at the expense of small notes, and thus gold emigrates from England thither. Credit is withheld, and in 1836 there are numerous failures and bankruptcies. In 1837 England succeeds in recalling gold, and then in May a formidable crisis breaks out in the United States which lasts until January, 1838. Nearly all the banks, numbering about 700, stop payment. Cash entirely disappears. "The distress and panic now pervading the United States," says a contemporary writer, "have never been equalled since the revolutionary war." The shares of the United States Bank fell from 118 to 98; towards the spring of 1838 gold came back from England and the crisis abated. These two great commercial countries endeavored each to secure for themselves an instrument of exchange wholly insufficient for both, by raising exorbitantly their rates of discount. In 1838 a very severe crisis broke out in France and Belgium. All recent values connected with industry depreciated ruinously. A flow of gold from England followed which lasted from the middle of 1838 till November, 1839. On the 2d of September the specie at the Bank of England had fallen to £2,406,000. They were on the eve of stopping payment. The bankers, headed by Baring, prevented this by drawing on Paris and Hamburg for £3,000,000. At the close of the year the specie had increased to £4,532,000.

The crisis was still more terrible in the United States. Cash disappeared and bank failures commenced in March in the Southern States and soon afterwards the Western were attacked, but those of New England resisted much better. In the State of New York only 4 banks out of 198 stopped payment. The final catastrophe happened on the 10th of October. The United States bank having tried all possible means to save itself was forced also to stop payment. Statisticians compute that, in 1839, 959 banks stopped payment. There were 33,000 failures, entailing a total loss of $440,000,000. (See BANKING, Vol. I., p. 431).

Crisis of 1847.—The period of expansion recommenced for England towards the year 1843. In 1844 capital is rapidly flowing in, and it is necessary to find employment for it. The specie of the Bank of England exceeds £15,000,000, and the rate of discount has fallen to 2 and even 1½. The fever for fresh enterprises, especially railways, commences. The *Economist* estimates that concessions granted at that time for new lines necessitated an expenditure of 200 millions sterling. The potato disease and a bad harvest in 1846 entailed the export of a large amount of cash in the spring of 1847. In January a violent upset of credit occurs, but during the summer gold returns and the danger is considered over; towards the autumn, however, a drainage of gold recommences. The Bank of England is obliged suddenly to raise its rate of discount and the panic declares itself. The first failures are among corn merchants, the quarter having fallen from 102 shillings in January to 49 shillings in September. In October the crisis has reached its zenith. Discount is at 8 per cent., consols at 79. Works and factories close and railway contractors discharge their workmen. Misery and despair reign everywhere. Sir Robert Peel's act of 1844 regulating bank issues is suspended. Soon gold returns, but the disasters were very considerable; France, Hamburg, and the whole of Germany having suffered.

Crisis of 1857.—This crisis commenced in Au
The expansion period begins in both England a
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cash in 1857. The banks, having already employed their deposits in advances to companies, were unable to resist the monetary pressure. On the 24th August they began to stop payment and continued till the 13th October, when the financial cyclone was at its height. There was a general stoppage. Discount rose to 50 and 60 per cent. The very best values were unsaleable. There was no instrument of payment. The mechanism of exchange no longer worked; 5123 bankruptcies were counted, entailing liabilities amounting to $299,000,000, but the enormous fall in all values soon brought the gold back from abroad, and on the 1st of January, 1858, the banks, with the exception of those of Pennsylvania, had recommenced their payments; to the latter three months further delay was granted.

This crisis affected England as early as the month of October, but the financial convulsion did not break loose in all its strength until November. The Bank of England specie fell to £7,000,000. On the 10th and 11th of November the money market was in almost an agony. On all sides failures upon failures. The most stable houses were in despair when the suspension of the act of 1844 eased the market a little, but the consequences were most disastrous for industry. Hundreds of thousands of workmen were without employment. Thence coalitions, riots, and alarming increase of pauperism. The crisis then reached successively France, Hamburg, and the Scandinavian States; these all suffered cruelly. Germany, Austria, the north of Italy, Batavia, Singapore, Buenos Ayres, Valparaiso, and all South America then fell victims. The financial cyclone went round the world sowing ruin everywhere. This remarkable phenomenon proves clearly how nearly the solidarity of nations is completed at the present day.

Crises of 1861 *to* 1864.—The crisis of 1861, which affected the English market in January, and the French in the autumn, was brought on by England having to pay a heavy balance in favor of the United States. This took all the gold from the bank. The rate of discount was raised in February to 8 per cent. in order to get back cash. In 1863 and 1864 purchases of cotton in the Indies caused a disturbance on the European market. The war of secession in the United States preventing the export of American cotton, it became necessary to have recourse to Egypt and India; and these countries, not accepting goods in return, had to be paid in silver. England bought silver from France, paying for it in gold, but there was a continual struggle between the two countries as to which should be left to pay the balance for Europe, and each was alternately raising the rate of discount. Hence constant disturbances, reductions in bank specie, interest varying constantly between 6, 7, and 8 per cent. Serious difficulties arose and numerous failures took place; then came a stagnation in business; but no convulsions like those of 1825, 1847, and 1857. It was a mere struggle for cash, but was none the less most disastrous. The crisis of 1873–79 belongs to the following category.

2. *Monetary Contraction Crises.*—Mr. Francis W[illegible] studied the effects of an increase or a [illegible] of m[illegible]llic money in his work entitled *[illegible]rade, [illegible] dustry* (1879). In an extract from [illegible]ort of the [illegible]netary commission of the Senate [illegible]d [illegible]rem[illegible]d above, a description of [illegible] occurred in the United [illegible] to be found. I have endeavored to describe the crisis from which Europe suffered during this period in my *Battle of Standards* (London, 1881). In my opinion a slow and unperceived crisis hung over Europe from 1816 to 1850, resulting from the fall in prices. From *Commonplace Fallacies Concerning Money* I repeat the following: "The effects of a slow and steady reduction of the stock of money are of a different character. They come into operation almost insensibly, being unaccompanied by any violent disturbance. Indeed, the cause of the evil is usually ignored, or else disputed. Instead of a burning fever it is a decline with which the social body is afflicted. A crisis of this description first occurred in the period 1816–1840, and it has been repeated from 1873 to 1880. Each was brought about by identically similar circumstances. They may be thus specified—1st, insufficiency of the production of the precious metals; 2d, exceptional demand for gold. Let us examine the facts. First, from 1816 to 1822, England, abandoning paper money, established the gold standard, and took from the general circulation of the world £20,000,000 sterling. This was an immense sum for that period, for it corresponded to ten times the then annual production. Secondly, the average annual production, which was, from 1801 to 1810, 259,000,000 fr., fell from 1811 to 1820 to 159,000,000 fr., sank still further to 151,000,000 fr. from 1821 to 1830, and amounted only to 202,000,000 fr. in the period from 1831 to 1840. In the years following 1873, the United States, Germany, and the Scandinavian States, by adopting the gold standard, absorbed £100,000,000 of gold. The production of both the precious metals taken together has not decreased; but silver, being no longer received in any mints, save for the currency in India, the monetary stock has had to be fed by gold alone, the production of which has diminished by one-third. The annual influx into circulation of the precious metal has thus fallen one-half—viz., from £40,000,000 to £20,000,000. Added to this, during these last three-and-a-half years America has taken from us £50,000,000 of gold. These three circumstances combined produced subsequently to 1873, as they did also after 1816, a monetary contraction. It is a phenomenon exactly the reverse of the expansion after 1850 which has been neglected by economists, though striking references to it are to be found in different works, notably in Alison's *England in* 1815 *and* 1845, *or a Sufficient and a Contracted Money;* in D. Lubé's *Argument against one Gold Standard*, for the period 1815–1836; and for the period following 1873 *Report of the Monetary Commission of the Senate of the United States*, 1876; Dana Horton, *Silver and Gold;* F. A. Walker, *Money, Trade, and Industry;* R. Giffen, *The Recent Fall in Prices* (in the *Journal of Statist. Soc.*, March, 1879)."

The following are a few passages from these writings: "Is there one man of sense and reflection whose mind is not sometimes occupied, and whose imagination is not startled by the actual and prospective state of the country? The monetary standard of England was what it is now and has always been throughout the rest of Europe—silver. Monstrous and incredible delusion! We are now told that the question is settled forever. But with a gold standard, circulation cannot increase; so it opposes an effectual barrier to all improvement. By the gold standard the currency has been reduced below the point that would afford remunerative prices with the present taxes."—*Argument against One Gold Standard*, D. Lubé, M.A., Trinity College, Dublin. In 1832 Lubé strongly advocated the silver standard.

This is what Sir Archibald Alison says on the subject of

monetary contraction: "The distress among the mercantile classes for years after the dreadful crisis of 1825, of the agricultural interest during the lowering of prices from 1832 to 1835, and of the whole community from 1835 to 1842, was extreme. The investment of capital in agriculture was, during this distress, everywhere grievously abridged, and in many places totally annihilated. Ireland, during the whole period, has been in a state of smothered insurrection. The heart sickens at the evidence, numerous and incontrovertible, which the Parliamentary reports for the last ten years have accumulated of widespread and often long-enduring suffering amongst the laboring poor of England." After having described the progress of this state of things Alison adds: "Some external cause must therefore have paralyzed and blighted the wealth of the country, in the midst of such an increasing growth of the national resources. Since the Peace, the all-important question arises, what was it which had this effect? The answer is, it was the contraction of the currency which was mistakenly made to accompany the resumption of cash payments by the bill of 1819 that has been the chief cause of all these effects." Alison gives a perfectly complete description of the unfortunate results of the monetary contraction, the real cause of which generally passes unobserved. "It is as difficult," he says, "to get the great bulk of men to understand that it is the currency itself that is shifting in value when great changes of price are going on around it, as it is to make them comprehend that the earth is moving rapidly through the heavens."—*England in* 1815 *and* 1845; *or, A Sufficient and a Contracted Money* (1846), page 51.

3. *Industrial Crises* are not treated here because they are apart from the present subject. English and American history offer numerous examples of them.

4. *Stock Exchange Crises or Krachs.*—The most remarkable were the Tulip mania in 1634–1638 in Holland, the Law mania in 1716 in France, and the *South Sea Bubbles* in 1718–20 in England. Of recent years may be mentioned the Vienna Krach in 1874, and the Boutoux Krach in 1882 in Paris. We will be brief. The passion for gambling and the desire to make money without any effort lead men to commit the same follies at different periods. They purchase at any price with the hope of selling higher and gain until suddenly everything gives way—the crash or "Krach" arrives.

In 1734 tulips were a *furore* in Holland: every one would have them, and the bulbs of this flower, brought from Adrianople by Busbeck in 1554, became objects for speculation. A regular market was opened up for them as for the public funds. Their value continued to increase, and all who purchased made money—a stock-jobbing fury seemed to have seized upon all classes of the population. Certain varieties, as for instance the *semper augustus*, were quoted at some thousands of florins, and peasants sold their land to buy tulips. Strange to say this mania lasted four years. When the awakening from this golden dream came the number of law-suits and of people ruined was countless. It was a general upset of fortune and capital.

In 1716 the Scotchman, Law, came to France under the regent's protection, and founded a bank like that of England, which has proved quite a success. Not content with that, he then started a Western Company for the Colonization of the Mississippi, and an Eastern Company for the Monopoly of Indian Commerce; and, finally, he issued shares for the conversion of the national debt and for undertaking the administration of the government taxes, which was to be placed in the hands of trustees. Six hundred and twenty-four thousand shares were issued at 500 livres each—at the same time 1,700,000 livres in bank notes were also issued for the purpose of buying up all the shares. The movement then became almost dizzy, and the market unnaturally inflated. In January, 1720, the shares of 500 livres were sold at 18,000. Shortly after the fall commences, and is most precipitate. Shares and bank notes are soon valueless!

At the same time the mania of the *South Sea Bubble* was raging in England. In 1711 the English Parliament authorized the formation of a society in favor of the state's creditors, which should be allowed to carry on a privileged trade in South American waters. Like Law this company undertook to reimburse and convert a portion of the national debt, and to effect this shares were issued which were soon feverishly sought after by speculators. As these shares rose to three or four times their nominal value numbers of persons gained much and quickly. Companies were then started on all sides and for all sorts of ends, frequently the most senseless imaginable. These starters of new companies asked one pound, and sometimes only one shilling, a share. Thus, with but a small sum, one could speculate in many different values. In London, as in Paris, all classes were drawn into the vortex. Change Alley, where the stock exchange was situated, presented the appearance of the Rue Guencampoix in Paris; in spite of a Parliamentary bill forbidding the formation of new companies, in spite also of the collapse of Law's system, which has just taken place (1720), the stock-jobbing fury amounted to absolute madness. For instance, newspapers advertised companies which requested so many millions "for a most promising undertaking, the object of which would be made known later." Subscriptions poured in. The shares of the South Sea Company rose to 1050, and even those which represented nothing were at par.

The better to concentrate all available speculative resources on their own shares the South Sea Company induced the House of Commons to interdict by a *scire facias* all creations or purchases of *bubbles*. This measure was disastrous. It proved the signal for realization. The fall then became far more rapid than had been the rise. Of all these companies scarcely one remained. An inquiry ordered by the House of Commons revealed countless forgeries committed by the directors of the South Sea Company. The consequence of this almost unexampled Krach was a tedious and painful depression in business.

Suggestions for the Prevention of Crises.—As there are three principal causes producing crises, so there are three remedies, each one applicable to a different cause.

1. Not to allow the metallic basis of circulation to become too much reduced. The most eminent financial men in England, and the Presidents of the United States who have specially studied the currency question, unanimously advocate an increase in cash which is the metallic basis of credit. And in point of fact France, where the metallic circulation is relatively two or three times more considerable than in England or the United States, has suffered much less from crises. The losses entailed by these crises, and even the monetary pressure so frequent in these two countries, costs far more to trade than the saving made on cash. The application of this remedy rests with the governments who can forbid the circulation of notes for small sums.

2. During the period of the expansion, not to join in the general movement and purchase shares or goods on credit. This remedy, of course, rests with individual prudence.

3. To raise from time to time the rate of discount. A failing in the observance of this rule greatly increased the violence of the crises of 1825 and 1847, and its application has prevented more than one of late years. This remedy is by no means agreeable to trade, but its disadvantages are nothing by comparison with the disasters it prevents.

Science, by studying the causes of phenomena, and wisdom, by applying the remedies indicated by science, may do much to prevent or, at all events, to mitigate the economic evils from which nations suffer. (E. L.)

CRITTENDEN, a family of Welsh descent, residing in the State of Kentucky, and prominently connected with the political and military history of the United States.

I. CRITTENDEN, JOHN JORDAN (1787–1863), a lawyer and statesman, was born near Versailles, Woodford co., Ky., Sept. 10, 1787. His father, John Crittenden, resided at first in Virginia, and was a major in the Revolutionary War, but settled in Kentucky at the close of that struggle. John, his eldest son, was educated in Virginia, and graduated at William and Mary College in 1807. Having studied law, he began the practice of his profession in his native county, but soon removed to Russellville, where he obtained a prominent place at the bar and great personal popularity. Like all talented young men of his State and time, he took an active part in politics. In 1809 he was appointed attorney-general of the Territory of Illinois, and two years later he was elected to the Kentucky legislature. His adventurous spirit also led him to join some expeditions against the Indians, who still gave trouble to the border settlements beyond the Ohio, and in the invasion of Canada in 1813 he was first brought in contact with Gen. Wm. H. Harrison, who, at a later date, when President of the United States, appointed his comrade-in-arms one of his Cabinet. In 1817, Mr. Crittenden, while Speaker of the Kentucky legislature, was chosen by that body to a seat in the United States Senate. Though the youngest member, he immediately acquired high reputation by a pathetic appeal in behalf of the unfortunate Gen. Arthur St. Clair, who presented a petition for payment of the arrears long due him. Crittenden was a supporter of Monroe's administration, but in 1819 he resigned his position in order to devote more time to the practice of his profession. He then settled at Frankfort, the State capital, and soon had great success through his power of working upon the feelings of jurors. The same qualities made him an effective stump-speaker, and as he did not renounce local office he was called frequently to serve in l ure, and was generally chosen Speaker. In the ov oversy caused by the legislature's recon- of the court of appeals after the latter had a certain stay law unconstitutional, Mr. was a conspicuous member of the Old C y. He assisted in settling the boundary bet entucky and Tennessee.

l, Pres. John Quincy Adams, a man in whose l career we may trace some points of re- Mr. Crittenden's, appointed him district Kentucky, and a year later nominated him the Supreme Court of the United States, s did not confirm his nomination. Pres. ying out his policy of removing from office all friends of the former administration, did not overlook Mr. Crittenden, and from 1829 to 1834 the latter was engaged exclusively in the practice of his profession. He was then appointed secretary of state for Kentucky, and in the following year was again elected to the United States Senate. He had on previous occasions refused to permit his name to be used when his friend Henry Clay was a candidate. As there was at that time a surplus in the national Treasury, he advocated the distribution of it among the several States. In the main he adopted the system of the great Kentucky statesman, which included a protective tariff, a national bank, and internal improvements by the general Government. In Aug., 1840, at the South-western Whig convention in Nashville, both Clay and Crittenden set forth these principles with matchless eloquence and decisive effect. Gen. W. H. Harrison, the candidate of the Whig party, was elected to the Presidency, and appointed Crittenden Attorney-General in his Cabinet. After Harrison's death it became evident that Tyler would not carry out the ideas of the party by which he was elected, and the members of the Cabinet, except Daniel Webster, sent in their resignations. Crittenden was soon restored to his place in the Senate, being appointed by the governor of Kentucky to succeed Henry Clay when that statesman resigned in March, 1842, with the intention of retiring from public life. A year later the legislature elected Crittenden for a full term. The schemes for the annexation of Texas were then vigorously prosecuted by the extreme Southern politicians, but Crittenden, though representing a slaveholding State, resisted the movement. When at last war was declared against Mexico, he gave hearty support to all measures necessary to secure victory. At the close of the war, being convinced that his friend Clay could not be elected to the Presidency, he supported the claims of Gen. Zachary Taylor to nomination by the Whigs, and prepared a statement of principles which, when embodied in a letter by the general, formed the basis on which the campaign was conducted. As Mr. Clay had continued to seek the nomination, this act produced an estrangement between the old friends which terminated only a few days before Mr. Clay's death in 1852. The Kentucky legislature then appropriately selected Crittenden to deliver the address in memory of that great statesman. The oration was one of his most eloquent, and did ample justice to the eminent talents, patriotism, and love of liberty of the greatest of Kentucky's public men.

In 1848, Crittenden resigned his seat in the Senate to become governor of his State. In 1850, when Millard Fillmore succeeded to the Presidency, Crittenden again accepted the position of Attorney-General, which he held till 1853. About this time a new party rose into prominence, urging the danger to American institutions from the rapid influx of foreigners and from the growing influence of the Roman Catholic Church. Its leaders, among whom Mr. Crittenden was the most prominent, called upon the people to elect only native-born Americans to office. This party was strongest in the border States, and by it he was again elected to the Senate in 1855. But another agitation on the ever-recurring question of the extension of slavery soon absorbed all the energies of the statesmen of the country. Crittenden steadily opposed the pro-slavery policy of Presidents Pierce and Buchanan. His special course had but few supporters outside of the border slave States, and this was further seen in the presidential elec-

tion of 1860, when Bell and Everett, the compromise Union candidates, whom he favored, received the electoral votes of but three States, Kentucky, Tennessee, and Virginia. In vain for years did the veteran statesman, faithful to the traditions among which he had been reared, implore and beseech each side in turn to try again the devices which had satisfied their fathers and had for a time mitigated the inherent evil of their institutions.

Abraham Lincoln was now elected, and the extreme Southern leaders at once made preparations in their respective States for secession. To avert this calamity, Mr. Crittenden, in Dec., 1860, presented in the Senate resolutions proposing that certain constitutional amendments should be offered to the States. They re-established for the Territories the line of 36° 30′, prohibiting slavery north and allowing it south of that line, admitted new States with or without slavery as their respective constitutions might provide, and made provision for enforcing the fugitive-slave laws which had become odious to the North. These resolutions, known as the "Crittenden Compromise," though supported by numerous petitions from all parts of the country, were not acceptable to either of the great parties. Their author ineffectually tried to induce Congress to provide a method by which they might be submitted to a popular vote. His sixth term as Senator expired in March, 1861, and when he presented the credentials of his successor, John C. Breckinridge, he delivered an impressive farewell speech. He was, however, elected to the lower House in June, and the War of the Rebellion having already begun, he presented resolutions defining its object on the part of the general Government to be simply the maintenance of the Union, without interfering with the rights or institutions of the several States. These resolutions were almost unanimously adopted, but as time passed on, and the necessity for vigorous and radical measures was felt by Mr. Lincoln's administration, Mr. Crittenden became conspicuous as an opponent of the methods employed for the suppression of the rebellion. He opposed the employment of negroes as soldiers; he objected to the formation of the State of West Virginia; finally, in his last speech in Congress, Feb. 22, 1863, he declared that the Government had broken its pledges and diverted the war from its original and proper object to the abolition of slavery. On his return to Kentucky, though in ill-health, he again became a candidate for Congress, but died suddenly at his home, near Frankfort, July 26, 1863. A monument to his memory, erected by the State of Kentucky, stands in the cemetery of Frankfort.

Mr. Crittenden was of spare figure and medium height, with a rather homely face, strongly marked with lines of thought. In speaking he was earnest and copious, yet often displayed a timidity at the beginning of his most effective addresses. Though an able advocate, he was not a profound lawyer. In social intercourse he was affable, generous, and dignified. Born in the year of the formation of the Federal Constitution, he was the last survivor of the distinguished statesmen of the second generation since its adoption. Full of reverence for that document, and firmly believing that the Union could be preserved only by a succession of compromises, he continued to the last to urge the application of palliating remedies which could never reach the seat of the disease of the body politic. However ineffectual were his efforts to prevent the calamities of civil war, it cannot be denied that when the conflict did come his influence and earnest appeals saved his native State from plunging into secession, and kept its government faithful to the Union.

His daughter, Mrs. A. M. Coleman, has published *The Life of John J. Crittenden, with Selections from his Correspondence and Speeches* (Phila., 1871).

II. CRITTENDEN, GEORGE BIBB (1812–1880), a major-general in the Confederate army, was the eldest son of the preceding, and was born at Russellville, Ky., March 20, 1812. He graduated at West Point in 1832, and was made a lieutenant of infantry. He resigned a year later, and studied law with his father in Frankfort, Ky. In 1846 he again entered the army as captain of mounted rifles, and in the war with Mexico was conspicuous for gallantry. After the battles of Contreras and Churubusco he received the brevet of major, and in 1848 was made full major. In 1856 he was promoted to be lieutenant-colonel. At the outbreak of the Civil War he was stationed in New Mexico, but resigned with most of his fellow-officers, and returned to his home in Kentucky. Later in the year 1861 he entered the Confederate service, and being appointed major-general was active in endeavoring to establish the power of the Confederacy in his native State. He was engaged in the battle of Mill Spring, Ky., Jan. 19, 1862, and after the death of Gen. Zollicoffer, who had the chief command on the Confederate side, drew off his troops and retired from the State. He was not prominent in the remainder of the war. In Feb., 1870, he was chosen by the Kentucky legislature as State librarian. He died at Danville, Ky., Nov. 29, 1880.

III. CRITTENDEN, THOMAS LEONIDAS, an American general, was born at Russellville, Ky., in 1819. He is the second son of Hon. John J. Crittenden, and studied law with his father. When the war with Mexico commenced his adventurous spirit led him to join the army. He served as volunteer aide to Gen. Zachary Taylor at the battle of Buena Vista, Feb. 22, 1847, and brought the despatches to Washington announcing the victory. Returning to his native State, he was appointed lieutenant-colonel of the Third Kentucky volunteer infantry, and proceeded to join Gen. Scott's army in its march to the city of Mexico. On the accession of Gen. Taylor to the Presidency in 1849, Col. Crittenden was sent to England as American consul at Liverpool, and on his return, four years later, he engaged in mercantile pursuits in Louisville. In 1860 he was made a brigadier-general of the State Guard, and when Gen. Buckner resigned his position as inspector-general of the State troops, Crittenden succeeded him. In Sept., 1861, he entered the Union army as a brigadier-general of volunteers, serving at first under Gen. Robert Anderson, and afterwards under Gen. D. C. Buell. He commanded a division at the battle of Shiloh, April, 1862, and was promoted to be major-general of volunteers for meritorious service. He commanded an army corps under Gen. Buell, and was at the battle of Perryville, Oct. 9, 1862, though not closely engaged. When the Army of the Cumberland was formed under Gen. W. S. Rosecrans, Gen. Crittenden had command of one of the three divisions. He rendered effective service at the battle of Stone River, Tenn., Jan. 1, 1863. He accompanied Gen. Rosecrans in his march to Chattanooga, commanding the right wing of the army. At the battle of Chickamauga, Sept. 19, 1863, he detached two of his divisions and sent them to the aid of Gen. Thomas, thereby disconcerting the plans of the enemy. His remaining division, while changing its position in order to engage

more actively in the fight, was cut in two by a Union battery retreating. The enemy, following close, prevented his troops from reuniting, and Gen. Crittenden was separated from the main body. Being left without support, and finding he could render no service there, he returned to Chattanooga. He was relieved of his command Oct. 10, 1863, but a court of investigation was afterwards appointed, and he was honorably acquitted, his conduct being highly commended. In the first campaign against Richmond in 1865 he commanded a division of the Ninth corps, and at the close of the war he was made a brigadier-general by brevet in the regular army. He afterwards resigned, and in Jan., 1866, was appointed treasurer of the State of Kentucky. This position he resigned in Nov., 1867, to become a colonel in the regular army. (J. P. L.)

CROCKETT, DAVID (1786–1836), an American hunter and humorist, was born at Limestone, Tenn., Aug. 17, 1786. Having run away from home when he was about twelve years of age, he associated with drovers till he was eighteen. He then returned, went to school for two months, soon after married, and went to live in the wildest parts of the State. In 1813 he was among the hunters who served under Gen. Jackson in the war against the Creeks. Returning, he settled on Shoal Creek, in a lawless neighborhood, where he was soon elected a magistrate. He was a member of the legislature for three terms, still continuing to live as a hunter. In 1827 he was elected to Congress as a friend of Jackson, and attracted much attention by oddities of dress and language, which were soon found to cover good common sense. He was re-elected in 1829 and 1831, but in the mean time had become an opponent of Jackson's administration. He was afterwards one of the Tennesseeans who flocked into Texas and took part in her contest for independence. At the siege of Fort Alamo, in San Antonio de Bexar, he was one of the six who last defended the fort, but were put to death by order of Gen. Santa Anna, March 6, 1836. Several books relating his exploits and eccentricities have been published, and his *Autobiography* was issued at Philadelphia in 1834, and republished in New York in 1882.

CROFTON, SIR WALTER FREDERICK, C.B., an English prison reformer, was born at Courtrai, Belgium, in 1815. He is the son of Major Walter Crofton (killed at Waterloo), and was educated at Woolwich Military Academy. He entered the royal artillery in 1833, and retired as captain in 1844. Becoming a magistrate in Wiltshire, he gave much attention to prison and reformatory subjects. In 1853 he went to Ireland as commissioner to inspect the state of the prisons, and in the next year was made chairman of the directors of convict prisons there. The system of progressive prison treatment and supervision of habitual criminals introduced by him was remarkably effectual in procuring their reform. As a part of this system intermediate prisons were established, consisting of cottages on farms, in which convicts were gradually prepared for using their freedom properly. This plan, commenced in 1856, has since been approved by the highest authorities on prison discipline and management in Europe and America. It has been adopted in Denmark and some other places on the continent of Europe. When reformatory schools were established in Ireland in 1859, the supervision of these was added to Mr. Crofton's other duties. In recognition of his valuable services the honor of knighthood was conferred on him when he resigned his office in 1862. While d in Ireland he had also carried out reforms in the Marshalsea debtors' prison, rendered famous by Dickens. In 1865 he established in England a refuge for female prisoners similar to the intermediate prisons. By frequent addresses and pamphlets in advocacy of his ideas, with the indorsement of many prominent persons, he succeeded in creating a public opinion on the proper treatment of criminals which led to the enactment of various laws on the subject. By these many serious evils previously existing have been entirely abolished. After the passage of the Prisons' Act (1865) he was engaged for three years as commissioner in seeing it properly carried out. He also assisted Miss Mary Carpenter in having the benefit of his reforms extended to India. In 1868 he was appointed a privy councillor in Ireland, and had further facilities for his favorite work. He also embraced the opportunity to introduce the industrial-school system which recently had been put in operation in England. In 1870 he retired from his position, but in 1877 again became for a year chairman of the prison board in Ireland. The merits of his work and his valuable experience have caused his advice to be sought throughout the civilized world, and he has received several marks of honor from foreign countries. The *Transactions* of the British Social Science Association since 1856 contain numerous suggestions from him on matters tending to the prevention of crime and the reform of criminals.

CRONHOLM, ABRAHAM PETER, a Swedish historian, was born Oct. 22, 1809, in Carlskrona. He became professor of history in Lund in 1849, but retired in 1855 in order to devote himself exclusively to literature. He has published a large number of historical works, which give evidence of great industry and careful investigation of original sources. The most important are *Väringarne* (1832); *Forn-nordiska Minnen* (1833–35); *Skånes Politiska Historia* (1847–51); and *Sveriges Historia under Gustaf II. Adolfs Regering* (1847–64). He died May 27, 1879.

CROOK, GEORGE, an American general, was born near Dayton, Ohio, Sept. 8, 1828. He graduated at West Point in 1852, and at once began his service on the western frontier. On the outbreak of the civil war he was captain in the Fourth Infantry, but in September, 1861, was made colonel of the Thirty-sixth Ohio Volunteers. He served with distinction in West Virginia, and with 1300 men defeated a large body of Confederates at Lewisburg, April 23, 1862. He was made brigadier-general Sept. 7, 1862, and had command of the district of Kanawha. He took part in the campaign in Northern Virginia and Maryland, and was engaged in the battles of South Mountain and Antietam. In January, 1863, he was placed in command of the Second Cavalry division of the Army of the Cumberland, and fought at Tullahoma and Chickamauga. In April, 1864, he returned to West Virginia, and defeated and killed Gen. Jenkins at Cloyd Mountain, May 9. For this and other services he was made brevet major-general of volunteers. He was conspicuous in Sheridan's campaign in the Shenandoah Valley, fighting at Opequan, Fisher's Hill, and Cedar Creek. In 1865 he was in command of the cavalry of the Army of the Potomac, and was captured Feb. 21, 1865, by guerillas, who surprised his quarters, but was exchanged March 20. He was afterwards engaged in the operations which resulted in the surrender of Gen. Lee's army. At the close of the war he was placed in command of the district of Wilmington, N. C., and in 1866 was transferred to the

district of Idaho, his rank at this time being lieutenant-colonel of the Twenty-third Infantry, with the brevet of major-general. In Idaho he spent six years in active operations against hostile Indians. His valuable service as an Indian fighter then caused him to be placed in command of the district of Arizona, where the Pi-utes and Apaches were giving trouble. In the summer of 1883 he completely reduced these tribes, pursuing them to their stronghold in the mountains of Mexico. In October, 1873, he was promoted brigadier-general, and in April, 1888, major-general. He took command of the division of the Missouri. He died at Chicago, March 21, 1890.

CROOKES, WILLIAM, F. R. S., an English chemist and physicist, was born in London, June 17, 1832. He studied in the Royal College of Chemistry, and in 1855 lectured in Science College, Chester. In 1859 he founded the *Chemical News*, andin 1864 became editor of the *Quarterly Journal of Science*. He early engaged in original research, his first paper "On the Seleno-Cyanides" being published in 1851. In 1861, by means of spectrum analysis and chemical reactions, he discovered the metal thallium, and in subsequent years fully investigated its properties and compounds. For this discovery he was in 1863 elected a Fellow of the Royal Society. In 1865 he discovered the process of separating gold and silver from their ores by sodium amalgamation. In 1872 he was led by his experiments in determining the atomic weight of thallium to consider the subject of repulsion resulting from radiation, and invented the radiometer, which he afterwards modified as the otheoscope. He was engaged at the same time in examining the physical phenomena of modern spiritualism, and having become convinced of the existence of force exerted by an intelligent, disembodied agency, he announced his conclusions in his *Researches in the Phenomena of Spiritualism* (1874). He also pursued a course of investigation in regard to the properties of matter in a vacuum, and published some of the results in his *Molecular Physics in High Vacua* (1879). He claimed to have discovered a fourth state of matter, the ultra-gaseous, in which the molecules are not in contact as in a liquid or gas, but isolated. In recognition of his discoveries the French Academy of Sciences gave him in 1880 a gold medal and a prize of 3000 francs. Mr. Crookes has also given much attention to the applications of chemistry in the arts, and has published treatises on the *Manufacture of Beet-Root Sugar in England*, on *Dyeing and Calico-Printing*, and has translated and edited many important German and French works on chemical subjects. He is also an authority on sanitary questions, especially the disposal of city sewage, on which he has published some pamphlets. In 1866 he made a report to the British government on the use of disinfectants in the cure of the cattle-plague.

CROP REPORTS. This article will treat more especially of the history, purpose, value, philosophy, and causes of inaccuracy of agricultural statistics and "crop reports," and of the distinction between the two. The actual statistics of the agricultural products of the United States and of the different States will be found under the head of "United States" and of the several States.

Brief History of Statistics.—In 1753 a bill was introduced in the English Parliament to secure a census; but it met repeated defeat for nearly half a century, and not until 1801 was the first census actually taken. For thirty years the published statistics were simply returns made to Parliament without any system or regularity. In 1832 a statistical department was created for the purpose of systematizing returns and publications. This bureau was in connection with the board of trade. Subsequently statistical bureaus were added to several other departments, and much confusion and duplication or neglect of returns resulted, so that in 1877 a royal commission was appointed to simplify and systematize the whole body of statistical returns. Their work covered a period of four years, and their exhaustive report still awaits the action of the government.

From the first the farmers of England were hostile to the publication of agricultural statistics. They were suspicious that it would increase taxation and rents, a fallacy still common; the fact being that accurate statistics simply *equalize* and *properly apportion* the burdens of taxation. Nearly a score of schemes were proposed, and were either dropped or, on trial, rejected as impracticable. One scheme of Mr. Poulett Thompson, president of the Board of Trade, was to collect information through the clergy. Printed forms were prepared similar to those now in use, asking for acreage and yield of various crops, number of different kinds of stock and the like, and sent to the clergymen of Bedford county; only 27 out of 126 made any returns. In 1853 an experiment was made through the Poor-law Board in two English counties, and through the Highland Society in three Scottish counties; and the next year in eleven English and Welsh counties and in the whole of Scotland. The work was a partial failure in England through prejudice against the Poor-law Board, and was discontinued after two years. It was continued in Scotland until disturbed by a quarrel over the patronage involved. The treasury asserted its right to appoint the collectors and audit all accounts. The society desired both, and settled the dispute by stopping the work. The same questions have arisen everywhere and always since, and only where the Agricultural Bureaus have been measurably free from the domination of political intrigue have they had any real vigor.

The success of this Scottish experiment showed the value of agricultural statistics and the feasibility of collecting them. It also diminished the prejudice against them, and after much discussion and effort the president of the Board of Trade obtained from Parliament, in June, 1865, an appropriation of £10,000 for the collection of agricultural statistics. The same month the rinder-pest appeared in England, and the measures used to prevent and check this pest, and the plan of compensating those whose stock was slaughtered to prevent its spread almost necessitated a cattle census. And yet so strong was the fear that it would increase individual taxation that it was necessary to state expressly, on the schedules or blanks, that "the number of live-stock belonging to individual persons would not be divulged." The returns were published in May, 1866, and were widely circulated among the farmers, both to impart the information contained and to convince the farmers that they contained nothing that could injure individ interests; and gradually the farmers came to see t to show less reluctance in making returns.

Ireland.—As the rinder-pest gave la agricultural statistics, so the potato fami 18 gave them to Ireland, and so v showe they have been maintained ar as the statistics are collected by

ulary force, who visit each farm as assessors do in most of the United States. The Registrar-General at Dublin superintends the work and reports to the lord-lieutenant. An abstract is published at once, and a detailed report is presented to Parliament. In other European countries the growth of statistics has been somewhat similar. It will be sufficient to give the present condition, simply, and modes of collecting.

In *Belgium* and *Holland* agricultural statistics are collected by a body of local magistrates, usually landed proprietors, and a detailed report is published annually by the governors of the provinces.

In *France* statistical committees in the various districts report to the *prefects*, and these in turn to the minister of agriculture, who compiles special statistics on live-stock, vine-culture, silk-worm-rearing, and the like, and also makes monthly reports on the condition of the growing crops.

In *Hungary* the product of the crops is collected yearly by parish magistrates, aided by the most intelligent farmers, and these returns are examined, corrected, and compiled by the statistical bureau for the country.

In *Austria-Hungary* full statistics of crops and live-stock are collected. In Hungary crop statistics have been published since 1869, and stock statistics since 1875. They are prepared by special agents, unprejudiced and well informed on agricultural matters. The original data on crops are given by the Agricultural Unions of the several districts.

In the *German Empire* the agricultural information is obtained through the co-operation of the governments of the several States, under special instruction from the imperial authorities. The statistics cover the entire ground of agriculture, and are grouped under three heads, viz.: (1) agricultural employment of the soil; (2) proceeds of the harvest; and (3) returns of live-stock. This system of co-operation between the local State governments and the general government was adopted in 1878, and has proved most satisfactory. The United States Department of Agriculture, at Washington, is now wisely adopting this plan of State co-operation in the collection of monthly reports on the condition and outcome of the crops. This will be again noticed further on.

Sweden and *Denmark* have very complete systems of gathering and publishing crop statistics. The other countries of Europe, the colonies of Australia, Victoria, New South Wales, South Australia, and Tasmania have their several systems more or less complete; in some, returns are voluntary; in some, enforced by penalty where reluctance to give returns makes it necessary.

In *Russia*, and even in *Austria* and *France*, the information is kept closely under the surveillance of the government, and is not permitted to go abroad when its publication can be supposed to injure the financial condition or prospects of the countries, or affect adversely the prices of meats or cereals, to be bought or sold as the case may be.

In the *United States* the collection and publication of agricultural statistics by the general government was first begun in connection with the census. Al h the census was ordained by the Constitution and the first one taken in 1790; and although of manufactures were taken in the cen- as well as of the number of persons en- ure, commerce, and manufactures re- although agriculture was overwhelmingly the largest industry; yet it was not until the census of 1840 that any attempt was made to take the statistics of agriculture proper. And even then, the schedules were most imperfect and the statistics were given very inadequately. In 1850 the control of the census was transferred from the Department of State to that of the Interior. The office of superintendent of the census was created, and greater attention was given to the statistics of agriculture. The ninth census, in 1870, introduced many valuable features into the agricultural schedules, one of which is that showing the total value of farm productions. This census presents the general statistics of agriculture by States, Territories, and counties, giving number, size, and value of farms, and value of farming implements; acres of land improved and waste; amount of wages paid during the year; value of orchard, garden, and forest products respectively; of home (farm) manufactures, and of animals slaughtered or sold for slaughter; the total value of all live-stock, of each kind; and the quantity and value of the several kinds of crops produced. The census schedules of 1880 contained much more exhaustive inquiries, and elicited fuller details.

So long is the period (ten years) from one census to another, and so long a time elapses after the facts are collected before they are published, that the various States of the Union finally saw the necessity for the collection annually of agricultural statistics within their own borders. But it is simply astonishing that they did not all see it sooner than they finally did. Ohio was first to move in the matter. The general census of 1840 was not fully before the people until 1842. The advantages to be derived from the agricultural statistics therein for the first time contained became manifest to the shrewdest of our farmers and legislators. Governor Allen Trimble and his son, Col. W. H. Trimble, of Highland county, were of those who clearly saw the need of annual statistics; and the latter, who was a member of the General Assembly of 1845–6, threw his whole force into an effort to establish a State Board of Agriculture, whose sole object should be to promote the agricultural interests of the State. Through his unremitting efforts, persistent even under temporary defeat, the law was passed that session creating such a Board, and establishing a special and perpetual fund for its expenses, from the show-licenses and the sale of escheated lands. Two of the first acts of this State Board of Agriculture were to establish an annual agricultural and industrial exhibition or "State Fair," and to provide for the collection of annual agricultural statistics. These statistics were collected, it is true, through the intervention of assessors and of the county and State auditors, but the inspiration, the impulse, and the publication were from the Board of Agriculture.

The older as well as the newer States were far slower in beginning the work, and even as late as 1862 the United States Commissioner of Agriculture found great difficulty in establishing any *basis for an absolute estimate* of the crops, because, as he distinctly states (p. 575 *Report for* 1862), "No State except Ohio has any means of giving the amount of farm crops with reliable accuracy, while the very imperfect returns in several of the States only serve to strengthen the prejudice against statistics so common among English farmers." Most of the older States, however, undertook the work with greater thoroughness a few years later, and most of the newer States undertook it soon after their admission to the Union, largely as a means of

showing their resources and inducing immigration. It is not necessary to recount here the time of beginning and methods of conducting the work in the several States.

But even these annual State statistics, much as they excelled in promptness and immediate value the general decennial census, even these were not published until a full year after the crops they reported were harvested, and often sold. Their value was therefore chiefly historic and retrospective. Hence there arose the necessity for, and the conception and elaboration of, what are now known as *Crop Reports.*

The distinction between these and agricultural statistics proper is, and should be always kept, sharply defined. The latter are wholly retrospective, the former are chiefly prospective. The statistics help to adjust and rightly apportion the burdens of taxation; the crop reports help producer and consumer to meet in views, and the bulk of the sales to be made on prices fixed upon the rational basis of the known supply and demand, instead of leaving both in ignorance that forces both to contribute to the enormous profits of heavy speculators whose large transactions warrant large outlay for special information on the condition of the crops of the world.

An act of Congress, approved May 15, 1862, established the National Department of Agriculture, and made it one of its duties to collect and publish monthly reports of the condition and final outcome of the various crops, and of the condition and number of live-stock at such times as seemed important. Through the representatives in Congress, chiefly, the department obtained as far as possible the name of some one intelligent man in each county of each State, who would undertake, without pecuniary compensation, to report each month on blanks furnished for the purpose. Reports were to be made by percentages, 100 representing a full average crop, in each locality, under favorable circumstances. If a given crop at any given period of its growth had only half a chance of maturing a full crop, its condition was to be put down 50. If it was ten per cent. extra in vitality and promise it was to be put down 110, and so on. Thus the various crops were followed all through their growth, and immediately upon the maturity of each its probable total yield was estimated in pounds, bushels, tons, etc. Of course the value of these estimates as an aid in making a forecast of the tendency of prices depended largely upon the competence of the Commissioner of Agriculture, and especially of his chief of the bureau of statistics, as well as of the various county reporters. Under the management of the present able chief, Hon. J. R. Dodge, who was also chief from 1865 to 1878, these monthly reports came to be of great value, as was generally recognized. But afterwards they fell into neglect. The department several times failed to discover widespread disaster and almost failure in whole States, in such important crops as apples, potatoes, and even wheat, until long after almost every one else knew of the virtual failures. Such reports were a great damage to the interests of agriculture and of business, and brought the reports and estimates of the department into entire discredit.

One result of this is now to be described. The agricultural departments of several of the great grain-producing States seeing this failure, this great lack of accuracy in the national department, and the resulting damage, themselves undertook the work in and for their own States. The Illinois State Board of Agriculture began the work, in a tentative way, in 1876 and the Kansas Board about the same time; though from the first the latter board worked the reports largely in the interests of immigration, and soon changed the monthly into more elaborate and persuasive quarterly reports. Georgia began in 1879 or 1880. The Ohio Board of Agriculture began in 1880, and with the four years' experience of Illinois freely given by its Secretary of Agriculture, Mr. S. D. Fisher, at once entered upon the work systematically and thoroughly.

But it was felt by the boards and secretaries, both of Ohio and of Illinois, that to secure the best results, all the great grain-exporting States must do a similar work, and that there must be concert of action and prompt intercommunication month by month, so that the actual condition and prospects of the crops might be known all the time, and the total product might be known, at least approximately, immediately on their maturity. This would give the solid basis of knowledge, so far as the crops of this country are concerned, on which to base valuable opinions as to the probable tendency and range of prices, and give it in time for the farmers to profit by it. The boards or secretaries of Illinois and Ohio, therefore, recognizing the need of concert of action, corresponded fully with the agricultural secretaries of the main grain- and meat-producing States, and united with several of them in calling the first Interstate Convention of State Boards of Agriculture. It convened at Springfield, Ill., Nov. 30, 1880, and its sessions lasted until Dec. 2. Delegates were in attendance from nearly all the great grain States. Other subjects were discussed in carefully prepared papers, such as "The Management of Fairs," by Secretary I. R. Shaffer, of Iowa; "Protection for the Cattle Interest from Pleuro-pneumonia," by Pres. L. B. Wing, of Ohio, etc.; but the main strength of the convention was devoted to developing the crop report idea. Able papers were read, on "The Growth of the Crop Report Idea in Illinois," by Secretary S. D. Fisher, of Illinois; on "The Relation of State Boards of Agriculture to the National Department of Agriculture," by Dr. R. T. Brown, Member of the Indiana Board of Agriculture; on "Crop Reports, their Scope and Value," by Secretary W. I. Chamberlain, of Ohio; on "The Work of the Indiana Board of Agriculture," by Secretary Alex. Heron, of that State; and "On Our Interest in the Foreign Grain Demand," by Secretary H. H. Young, of Minnesota. These papers were fully and freely discussed by the convention, nearly all the delegates taking part. It was fully agreed that an accurate knowledge of the condition of the growing crops of the world, month by month, is the only legitimate basis of prices and of trade. Also, that the agricultural departments of State and nation are bound to furnish such information to the people month by month in the interests of business, commerce, and agriculture, and to see to it that the information is accurate and impartial; that is, in the interests neither of bulls nor of bears in the grain markets, but of truth. Also, that this could be thoroughly done only by a free and cordial co-operation of State Boards with the National Department of Agriculture. These views of the convention were crystallized in the following resolutions, unanimously adopted:

1. "That we believe the time has fully arrived when each of the States represented by us should undertake the work of issuing prompt and accurate monthly crop and stock reports during the growing season.

2. "That in our opinion uniform and

among these States in this matter will secure results most valuable to the agricultural and business interests of the country.

4. "That in order to determine the fair market value of the annual grain and live-stock products of the United States, it is necessary to obtain the earliest and most complete information attainable as to the extent of the foreign supply of grain and live-stock, and the surplus for the markets of the world, and the proper officers of the government are therefore earnestly requested to obtain, through the consular and other foreign service of the United States, the most complete possible data concerning the extent of the annual production of grain grown in foreign countries, and the condition of the growing crops as the season advances.

5. "That the information so obtained be given to the associated press, and be forwarded through the national department of agriculture to the several State boards of agriculture at the earliest practicable date after receipt.

6. "That the several State boards of agriculture collecting live-stock and crop statistics are requested to reciprocate and forward such reports to the national department of agriculture as promptly as possible.

9. "That all the grain- and meat-producing States of the West and South be cordially invited to unite with us in our next meeting to be held next year at the call of our executive committee."

The proceedings, papers, and discussions of that convention were widely published in the Western daily and agricultural papers, and in full in pamphlet form, and had great influence on the legislatures and boards of agriculture at the West, nearly all of which States have since entered upon the work of reporting the crops monthly or quarterly, or at special periods of importance, and with more or less fullness and accuracy.

Before the next Interstate Convention was convened, a new administration had come into power in Washington, and Hon. G. B. Loring was appointed Commissioner of Agriculture. He had recalled the able statistician, Hon. J. R. Dodge, as chief of the department of statistics, and had issued a call for a national agricultural convention, to be held at Washington, Jan. 10–18, to consider, among other subjects, this very matter of efficient crop reports. The second Interstate Convention was held in Chicago during the Fat Stock Show in November. The full and free discussions then resulted in a series of resolutions, unanimously adopted. They were similar in scope, but more full than those of the first convention. The first three recognize the necessity and demand for prompt and accurate monthly crop reports in each State; recommend uniformity of action; offer a detailed plan for collecting these statistics in the several States, and pledge the hearty co-operation of the boards of agriculture there represented with the national department. The remaining resolutions are as follows!

4. "That the prompt consolidation and publication of these monthly reports from different States can be best accomplished through the national department of agriculture, and we recommend that all important final footings in each State be telegraphed to the commissioner at Washington not later than the 8th day of each month of the growing and harvesting season.

5. "That an executive committee of nine be appointed to attend the national convention called by Dr. Loring, United States Commissioner of Agriculture, and to be held in Washington the second week in January, 1882, and that said committee be authorized, in consultation with Commissioner Loring, to arrange all details necessary to harmonize the work of the State and national departments, and render it more efficient; and, especially, to prepare blanks to be used in common by all States in this monthly statistical work.

6. "That in order to determine the fair market value of the annual grain and [illegible] of the United States, it is necessary to obtain information as prompt and as reliable as possible, month by month, as to the condition and prospects of the foreign grain and meat product, and consequent probable demand for our surplus, and that, therefore, we urge our most able United States Commissioner of Agriculture to obtain such information through our consular and other foreign service (through courtesy of the department of state), and publish it promptly through the associated press, and send it by telegraph to the secretaries of all State boards that furnish like information from their own States to the United States department.

7. "That we urge each State to use every effort to perfect its own system of monthly reports, making it so prompt, thorough, and accurate that the United States department shall not be compelled to go over the ground with a separate corps of correspondents; but being relieved of this drudgery of detail, shall have the more time and force for other important work in the interest of agriculture."

The delegates appointed under the 5th resolution above, as well as many others, attended the National Convention, and threw the entire weight of their influence into the effort to secure concert of action between the agricultural departments of the nation and of the several States, and especially into the effort to obtain through the national department monthly information as to the condition of the crops of the whole world. A very able paper was presented by Archibald Blue, Secretary of the Bureau of Industries, Toronto, Canada, on "The History, Value, Scope, and System of Agricultural Statistics." Also one by W. I. Chamberlain, Secretary of the Ohio Board of Agriculture, on "National and International Crop Reports." Free use has already been made of both these papers in the preparation of this article, and full credit is hereby given. The latter paper gave the history of the growth of the crop report idea in the United States, and urged the importance and showed the means of greater thoroughness here and of like work in every country of the world whose production or consumption materially affects the great problems of supply, demand, and price. It showed, by a careful array of figures, that our wheat export was increasing at an amazing rate, having been as follows: for 15 years, before and including 1877, 46,000,000, or 18 per cent. of total crop; for 3 years since 1877, 170,000,000, or 37 per cent. of total crop.

The paper showed, too, that the export was exceedingly variable, having been nearly three times as great in 1878 as in 1876, and just twice as great in 1879 as in 1877. "And yet," the paper adds, "notwithstanding the vastness, the rapid increase, and the great variableness of this demand, the astonishing fact meets us that, up to the present time, we have had *absolutely no official means* of ascertaining the real condition of the European and Asiatic crops. The heavy grain speculators, on the other hand, have combinations by which they get this information promptly and with approximate accuracy. They keep each other informed, and by concert of action aid each other. No matter in what country they may be located, no matter how widely they may be separated, their correspondence is as frequent as occasion requires, even though at times it necessitates the daily use of oceanic cables. All this is legitimate. The information costs them much money, often up into the tens of thousands. It belongs to them, and they are under no obligation to divulge it, and they never do. Not only that, but there is nothing to prevent the constant and wide publication of false or misleading statements; reports exactly the reverse of what is true; and that such mis-

leading reports are actually and most industriously published, no one can doubt who calls to mind the fact now notorious, that the actual and alarming shortage in European crops for the past four years has been concealed so far as possible each year, or at least strongly denied in the newspapers of this country, until the bulk of our wheat crop was largely out of the hands of the farmers."

The same paper claimed that the crops and crop prospects of each State could (for various reasons given) be best learned by the State agricultural bureaus or boards, but that this vast foreign work could only be done by the national department. It submitted a rough plan for mapping out the grain production and consumption of the various nationalities of the world, and frankly admitted the vastness of the work. On this point we quote from the paper as follows:

"But it is no light task to map out the nationalities of the world in comprehensive form, and show the population, wheat production, wheat consumption, including seed, and the consequent surplus or deficit of each, and thus deduce the grand total of the whole. It is no light task to get prompt and fairly accurate estimates, month by month, of the condition of the crops, or at least of the wheat in every State of the Union and in every foreign nationality, whose production or consumption affects the future export demand and the consequent tendency of prices.

"But the interests of agriculture and of commerce, I think, require that this work be done, and well done, and done this coming season; and our national department of agriculture is capable of doing it. Our signal service, Argus-eyed, watches every current, cloud, wind, and storm, notes the storm-centre, the direction, the general velocity, and the local violence, and then with an hundred times the hundred hands of the fabled Briareus of old mythology, it daily flashes the facts over all our telegraphic lines, and posts them up in every port and hamlet, to aid or warn and protect our navigation, our commerce, and our agriculture.

"A similar service is now, I believe, imperatively demanded of this national department of agriculture in regard to the exact condition, month by month, at least of the wheat, in all important wheat-producing and wheat-consuming countries of the world. And as no work is more necessary, none can be more acceptable and popular, not only with farmers and business men, but with our legislators also, and so I am sure the necessary aid from Congress will be promptly given, if only the work is once well begun."

Immediately upon the conclusion of this paper Commissioner Loring seconded its views and claims in an able speech, and, after further discussion, resolutions were unanimously adopted urging immediate action in the matter of home and foreign monthly crop reports by the National Department of Agriculture, in harmony with the several State boards, according to the general federal idea and plan proposed in Sec. Chamberlain's paper, and urging Congress to make the necessary appropriations and take the necessary steps to make the foreign work a success.

It is gratifying to announce that Congress promptly responded, that the agricultural departments of State and nation are now working in harmony, and that the foreign work is begun. The commissioner says in his report:

"Western grain-growers have been especially anxious that the department should undertake prompt collection of European crop statistics; and the recent appropriation for the extension of work of its division of statistics renders practicable the initiation of an enterprise of so much importance.

"A central office for such collection of statistics is to be established, with headquarters in London, at the office of the United States consul-general, and Edmund J. Moffat, Esq., of New York, has been appointed special statistical agent in charge of the work, and he is also appointed by the department of state deputy consul-general at London."

The Philosophy of Statistics and Crop Reports.—The State and National Governments are justified in expending the people's money in collecting statistics and crop reports on the following grounds: *First.* Carefully prepared statistics of crops and stock, of actual acreage and yield, and the like, are absolutely necessary to enable these governments to apportion equitably the burdens of taxation, and to adopt wise laws regulating the various property interests concerned.

Second. Prompt and careful crop reports are necessary, month by month, to secure an equitable adjustment of prices, to prevent the wild fluctuations that always arise from ignorance of facts, and to aid the distribution of local abundance into regions of local scarcity. That the State and National Governments should gather and publish this information is evident from the fact that it is impossible for the great body of producers and consumers to gain any adequate knowledge otherwise, though heavy buyers or combinations of speculators can do so, and thus "bear" the market until the crop is bought at too low a figure for the facts, and thus defraud producers, and then "bull" the market till they have "unloaded" at too high a figure for the facts, and thus defraud consumers.

That such is the actual result may be seen from a review of the manipulation of the wheat crop of 1879. It is now known that though the crop was large in this country, yet in England and other European countries it was small or nearly ruined by heavy storms, and that the foreign demand for our surplus *would be immense.* This latter fact the farmers had no means of learning; the heavy speculators suppressed the fact or stoutly denied it, until the bulk of the winter wheat-crop had left first-hands at about ninety cents per bushel. If the farmers had been as well informed as the large buyers, they would have held for the sure advance. But they were not. They were isolated. Each had but a small interest at stake, and could not afford to procure costly cable information from paid correspondents abroad. Of course, the contest for a fair adjustment of prices was most unequal, and the result was quite natural, as stated, viz.:—that the bulk of the winter-wheat left the farmers' hands at 90 cents to a dollar, and then the price rapidly advanced to $1.30 per bushel, and the consumers had to pay that price. And the margin went into the hands of the few men who had the knowledge of the foreign needs.

But it is plain that the interests of agriculture and of business are best promoted, and future production is most increased, when the farmers really get the fair price for their products and the dealers simply get fair and full compensation for the cost and skill of handling the product. For example, in the case just cited over 100,000,000 bushels of wheat were sold for $1 per bushel or less, when it was really worth on the basis of foreign demand $1.25 per bushel. The consumer paid just as much for his flour, and this 25 cents per bushel, or $25,000,000 or more, went into the hands of the speculators, to enrich them and to be expended largely in the cities on mere luxuries. But if the farmers get this $25,000,000, it would go to better farm-buildings, improvements, machines, fertilizers, and would assuredly increase the total future

In short, this $25,000,000 is then turned into real productive capital—into agricultural prosperity that shall also increase our commercial prosperity for years to come.

The Accuracy of the Work.—Great accuracy has already been attained by the use of "Threshers' blanks." The plan was first proposed by Sec. Chamberlain, of Ohio, in the Interstate Convention of 1880, at Springfield, Ill., as follows:

"By suitable headings in the schedules or blanks used by township assessors, we can obtain in May the acreage for the then current year of the main cereal crops. Then by furnishing, when threshing begins, suitable threshers' blanks (for acres and bushels threshed) to our township correspondents to give the leading thresher or threshers of their townships, we can by August 10 or 20 know and publish the actual yield per acre of the first three weeks' threshing, and this would probably give the basis for an exceedingly close approximation to the entire amount of wheat in the State."

Exactly this plan was adopted in Ohio the next year, and by August 15 there was published the estimated wheat-total of the State, based on three weeks' threshing by about 1,000 machines. Just one year later the actual statistics were published of the yield as learned by the township (paid) assessors, on actual inquiry of each farmer in the State. The figures are as follows, as learned by the two methods:

Estimate, from 3 weeks' threshing published Aug. 15, 1881	38,010,000
Actual returns of same crop published Aug. 15, 1882	38,100,000

The difference was less than one-fourth of one per cent. of the total. And the advantage of the first estimate was that it came before the crop was sold, instead of a year too late; and in connection with like reports from the other States and from Europe (hereafter to be had) would furnish the just basis of price in time to be of some service to producers. The annual statistics come a year too late to influence prices.

It is proper to state that this same system of threshers' blanks has already been adopted by Michigan and Minnesota, and probably will be by nearly all the great grain States by another year. It will furnish the basis of actual knowledge and not of mere opinion, and will be of immense use in forecasting the tendency and probable range of prices.

Causes of Inaccuracy.—Theoretically, the annual statistics should be more accurate than the monthly crop reports, since they are based on actual inquiry of each individual farmer. But, in point of fact, certain causes of inaccuracy must be carefully considered. The returns are taken nearly a year after the crops are harvested and sold, and the acreage and total yields are often in part forgotten. Then in the older States the idea of taxation leads farmers, perhaps unconsciously, to understate totals; while in the newer States and Territories the tendency is just as strong to overstate, so as to make a good showing and induce immigration. Both of these tendencies must be kept in mind. And

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overstated nor understated, nor in

these days of railways, steamships,
phones require accurate informa-
of the crops of the world, at

least as often as once a month during the growing season. It is evident that our agricultural boards or bureaus must respond fully and accurately. And in time the demand may be even for more frequent bulletins. But greater frequency will endanger lack of accuracy. And accuracy is all-important.

The Actual Benefits.—The benefits already actually derived from these reports in the West have been great. For example, the apple- and the potato-crops in Ohio in 1881 were only about one-third of the usual crop. The Ohio crop report stated and emphasized this fact (though the Washington report gave them in August at 70 and 92 per cent. respectively). In certain counties there was local abundance. The farmers in these counties, having the crop reports before them in all the papers, held for and obtained $1 or $1.20 per bushel, instead of taking the 40 cents per bushel that speculators were early offering on contract, and that the local abundance seemed to pronounce sufficient. Again, the wheat-crop in Ohio in 1881 was fairly good—over 38,000,000 bushels. Had it been equally good all over the country, the price would not probably have gone above $1 or $1.10 in Chicago. But the June and July and even the May reports from Illinois, Iowa, Indiana, and Michigan (the only other winter-wheat States that had then adopted the plan of thorough monthly crop reports) made it plain that the total for those States would be only about one-half the previous year's total, and that the total shortage of winter-wheat in the United States would be nearly or quite 120,000,000 bushels, as compared with 1880. This information was promptly given to the press of Ohio and of the whole country by the Ohio Board of Agriculture, even though the Washington reports were far more conservative and named a far smaller deficiency. The farmers of Ohio and elsewhere believed their own report. They read the facts and conclusions in many papers and on every hand, and the whole community came to believe and know that at least the wheat and corn crops of 1881 were really very short, and that the prices must rule high. And, as a rule, the farmers held and received $1.35 or $1.40 per bushel for wheat—realized the profits that justly belonged to them. And so this information, thus gathered and widely published by the boards of five States and believed by the people, was, in the opinion of judicious men acquainted with the facts before and since this work began, worth $10,000,000 to the farmers of Ohio alone: for that sum would be less than 27 cents per bushel on the total crop; and this 27 cents (or $10,000,000) would have gone largely into the hands of heavy speculators but for this prompt information spread before the eyes of all the people. Indeed, such was really the case with the crop of 1879, before this crop-report work was begun by any State except Illinois, and while the Washington reports were almost worthless.

It is gratifying to add that several States already have reporters in each township, and that others are rapidly following; that the "threshers' blanks" are rapidly coming into favor; that averages and totals are given by counties in the State crop reports, thus pointing out local scarcity or abundance; that the work of the State and national departments is now being harmonized, and that the latter has at last earnestly grappled the great problem of promptly reporting by telegraph the condition of the crops of the world.

What is claimed for the system when fully developed

briefly recapitulated: (1) It will show at a glance each country's probable annual surplus of production or its deficit. (2) It will show whether the total of each crop for the world (or for the area possible distribution) is large, with a tendency to prices, or small, with a tendency to high ges. (3) It will thus serve to prevent sudden and ient fluctuations in prices, and consequent panic and rulsions in business. (4) It will show the probable tent for the year of the carrying trade, and enable ae railway and shipping interests to make timely provision. (5) It will in time create an equilibrium in prices, less the actual cost of transportation and distribution. (6) It will point out (by counties) the local abundance and scarcity, especially of fruits and perishable products, give shippers and carriers the necessary information, and thus prevent glut and waste in one place with great and corresponding scarcity near by. (7) It will show the resources of any country and serve as a wise guide to emigration and immigration, and to just legislation.

The crop-report idea is in its infancy. It rests, however, on a solid basis of philosophy. Its great utility has already been attested by abundant facts. It is destined to assume a breadth, a magnitude, a promptness, and an exactness and minuteness of detail of which even its most sanguine friends have no adequate conception.

(W. I. C.)

CROPSEY, Jasper Frank, an American landscape-painter, was born at Westfield, on Staten Island, N. Y., Feb. 18, 1823. In his youth he spent five years in the study of architecture, but afterwards turned his attention to landscape-painting, commencing with water colors. In 1847 he went to Italy, where he studied for three years, and produced among other paintings The Pontine Marshes (1850). On his return to America he was elected a member of the American Academy of Design, of which he was also ready an associate. In 1856 he went to England, where he remained seven years, busy with his art, and respected by critics. He resided in New York from 1863 to 1885, when he removed to Hastings on Hudson. As fruits of his residence in Italy we have The Pontine Marshes (1850); Southern Italy (1875); and The Sibyl's Temple (1877). His English pictures include Corfe Castle, Under the Cliff, Roadside in the Isle of Wight, Stoke-Pogis, The Olden Time, and Anne Hathaway's Cottage. But Cropsey is seen at his best in his delineations of American scenery, some of which have attracted especial attention when exhibited in London and Paris. Among these pictures are The Backwoods of America (1857); Autumn on the Hudson (1863); Autumn in the White Mountains (1864); Mount Jefferson (1868); On the Wawogonda (1874); Staten Island (1870); Autumn on Lake October in Ramapo Valley (1885); Autumn on the George (1886). In water colors he painted White Mountain Scenery (1869), and On the St. Lawrence River (1878).

CROSBY, Howard, D.D., LL.D., an American Presbyterian minister and author, was born in New York, Feb. 27, 1826. He graduated at New York university in 1844, and was made professor of Greek in the university in 1851. In 1859 he became professor in Rutgers College, New Brunswick, where he remained a year as pastor of the First Reformed church. In 1863 he resigned his charge in Fourth Avenue

CROSS, Mary Ann (1820–1880), *née* Evans, an English novelist, who won her fame under the pseudonym of "George Eliot," was born at Griff House, near Nuneaton, in Warwickshire, England, Nov. 22, 1820. Her father, Robert Evans, had begun life as a carpenter, and had become land agent to several large estates. When she was fifteen years old her mother died, and with her father she moved to Toleshill, near Coventry, where she engaged in severe study. One fruit of this is the translation of Strauss's *Leben Jesu* (1846). On her father's death Miss Evans carried on her studies at Geneva, and after her return to England, became a boarder in the house of Mr. Chapman, and contributed some articles to the *Westminster Review*, of which he was the editor. The most important of these were written between 1854 and 1857 after she had translated Feuerbach's *Essence of Christianity* (1853), but she had not yet found her genuine means of expression. During these years she made the acquaintance of many leading thinkers, and among others of George Henry Lewes. With him she afterwards lived as his wife and assumed his name, but without legal sanction that being impossible on account of the existence of another wife, from whom the complication of En law made a divorce impossible. Mr. Lewes di 1878, and in May, 1880, "George Eliot" (to w pseudonym which her novels had by that time familiar to the world), married Mr. J. W. Cross died Dec. 22, 1880.

Mr. Lewes directed her to fiction, and her tempt was the *Scenes of Clerical Life*, which in *Blackwood's Magazine* in 1857, and in b in 1858. This book was followed by *Ad* (1859); *The Mill on the Floss* (1860); *Si* (1861); *Romola* (1863); *Felix Holt* (1866 *march* (1871–72); and *Daniel Deronda* (other writings were the poem, *The Sp* (1868), some miscellaneous verses united

entitled *The Legend of Jubal* (1874), and a little collection of social essays, *The Impressions of Theophrastus Such* (1879).

Every writer, no matter how great his genius, is dependent for a good part of his method of expression upon the literary fashions of his time; and George Eliot is no exception to this rule. On the other hand it is equally true that no great writer leaves the form of composition which he chooses exactly where he found it. He is constrained to adopt a familiar method, but his genius stamps that with its own mark. Thus, George Eliot found the novel awaiting her as the readiest form for the conveyance of her views on life and its lessons. The English novel, too, was well advanced in its development from the story of incident to the study of character. The romantic novel, which had reached its highest form in Scott's hands, had begun to lose its importance. William Harrison Ainsworth and Bulwer were unable to rival the great master, and the last named had begun to study single characters. To be sure, the surroundings in which he placed them were unreal, and he sought to give a romantic interest to exaggerated villains. Dickens went farther in the gradual advance towards realism by letting the vicissitudes of paupers and outcasts take the place of the mental struggles of the vicious; while Thackeray studied society as he saw it. Thackeray's method was the one most prominent in English fiction when "George Eliot" began to write. His principal subject, fashionable society, attracted her less because, for one thing, it had not come under her observation, and we may well doubt whether, if she had known it well, she would have been attracted by the artificiality of the relations it implies. As it was she followed the most important current by selecting for her subject human beings whose main importance was not their social position; and in the way she wrote about them she shows how much she was influenced by Thackeray. In her early novels we find bits of social satire which were inspired by him, but they are singularly inapposite in so serious a writer and profound a thinker as her writings show her to be.

In her first stories, *Scenes of Clerical Life*, we find George Eliot apologizing for her selection of "commonplace people" for her subject, with a deprecation of criticism that her success has made unnecessary. The commonplace people who were already known to literature had been introduced mainly as curiosities; in Bulwer's hands they were exceptional villains; even in Dickens's they shone with unaccustomed virtue; but George Eliot saw them as they were, and in the simple stories of Amos Barton and of Mr. Gilfil she showed the world how full of fascination, how deserving of study, were the far from exceptional adventures of far from extraordinary people. It is not the general importance of our own lives that makes our own careers interesting to ourselves, and we are not concerned in the fate of our friends simply because their experience abounds in melodramatic incidents, but because we know with precision how we have been tempted and have withstood or succumbed to temptation—have struggled and failed, or have struggled and
[illegible]ceeded. It is our knowledge of the doings
[illegible]hat helps to endear them to our hearts.
[illegible]has the rare power of giving us similar
[illegible]f the inmost experience of the characters
[illegible] writes—of making them real, vivid, living creatures, with whom we sympathize because we understand them.

The advance of literature towards democracy has, of course, been gradual, and in the work of certain French novelists we may see it extending its field so as to include social outcasts; and these are now treated with exaggeration. Before long melodramatic naturalism will give way to a truer form of art, and the field is now open for some writer to do for this subject what George Eliot did for another class. The connection between literary interest and political struggle is sufficiently obvious. The anarchists of whom we read in the papers are beginning to feel their own power just when they become of interest to writers. In the same way, George Eliot studied "commonplace people" at the moment that the *bourgeoisie* attained political power.

What George Eliot studied with especial pains was the moral nature of her characters. This interest in the ethical side of life is seen in all her work; it is one of the qualities that most commands our attention, and the one, it may be added, that most endangers the future fame of her work. We see it appearing in the precise study of motives that makes her novels read like revelations of undeniable truth in a representation of her personages that shows us how good and evil are twisted in a mingled strand in every human being. She understands the complexity of life, and is far from calling any one person wholly good or wholly bad, as we are forever tempted to do with regard to ourselves and others. It is our continual struggle to find one adjective that shall fully describe each one of our friends; her books, life-like, teach us the impossibility of such swift judgments. Amos Barton is not merely odious; he is faithful and painstaking. Mr. Gilfil is not simply a harsh, weather-beaten, sharp-tongued old man; beneath his apparent severity there lies the memory of his early love. "Many an irritating fault," George Eliot says, "many an unlovely oddity, has come of a hard sorrow, which has crushed and maimed the nature just when it was expanding into plenteous beauty; and the trivial, erring life which we visit with our harsh blame may be but as the unsteady motion of a man whose best limb is withered." In *Janet's Repentance*, again, we see George Eliot's tenderness for failure, the gentleness which is part of the same sympathy that makes her clear-eyed to detect the real solemnity and picturesqueness of even the most arid-seeming life. This same forgiving sympathy, which is in part a consolation for the agony of more sensitive perception, shows itself in George Eliot's treatment of the various obscure persons with whom she fills the pages of her novels, the incidental, unimportant characters who form the vivid background for the principal heroes and heroines.

This interest in the ethical questions of life admits of explanation, in part it was doubtless one of the manifold results of the general literary interest in individuals, which demanded exacter study of society. There were, however, other causes at work, among which was the decay, in the generation to which George Eliot belonged, of a belief in the dogmas of religion. As a matter of fact, we know that this writer went through this experience, and doubtless she felt the necessity of reconciling the world of sin and misery with what was to her the gospel of morality. We see in Clough's poems continual traces of his mental struggle over his less serious religious difficul-

ties, and in George Eliot's stories the basis is always the relation of conduct to the ethical sense. It is true that almost all English novels are vehicles for the conveyance of moral instruction, but while in the last century they attacked gross vices, and under the inspiration of Miss Edgeworth they fostered rudimentary virtues, we find George Eliot, with a wider vision, discussing intricacies of character rather than chronicling a mere list of misdeeds. She sees that real corruption lies in the heart of man, and she dissects wickedness until she finds its cause in vice or weakness. The skill with which she does this is nothing less than appalling; and she performs her task without betraying emotion. She is not hostile to the weak or vicious; she is as impartial as life. They are sufficiently punished by the natural consequences of their actions, which accumulate the inevitable results as does the Buddhist's Karma. Certainly the ordinary novelist's wilful heaping together of horrors is trivial by the side of the slow march of destiny which George Eliot chronicles. In *Adam Bede* we see the fatal consequences of weakness that overrides generosity and good intention. In *The Mill on the Floss* we have a most vivid representation of the complicated way in which one's very virtues may become the faults that wreck one's life. Thus Tom's uprightness turns into cruelty, and his sister's happiness is destroyed by his independence, and her affectionate and imaginative nature, which is her greatest charm. The wise perception of these complex truths raises George Eliot to a high position among moralists, and in all her work we find traces of similar fruitful study of life.

Silas Marner has another claim upon our attention, of a sort that is lacking in some of her other novels, in that it is a story after the conventional fashion, with a beginning and an end. What is still more striking is the allegorical method in which is told the poor weaver's consolation for the loss of his gold by finding the little girl at his fireside. This is a dramatic incident of a sort that George Eliot generally avoids. In *Romola*, again, we find certain traces of concession to the dramatic instinct in the final vengeance of Baldassoro. This ending, however, sinks into insignificance in comparison with the deeper tragedy which the story contains in the account of Tito's treachery and Romola's unhappiness. The book, in spite of its undeniable merit, has a certain remoteness of interest, because the historical novel is distinctly a thing of the past, and the very qualities that lend the framework of the story exactness add to it a tone of pedantry which mars the total effect. Nothing more distinctly marks the movement of the age towards realism than the general distrust of stories that aim to set before us a picture of the past. We are never quite sure that the representation of remote times has the same exactness that we require in a story of the present, and the suspicion of this error is fatal.

Where George Eliot infallibly commands admiration is in her English stories, although possibly less in *Felix Holt* than elsewhere. At least this novel pales before *Middlemarch*, which is generally regarded as the greatest of her works. Certainly it would be hard to name a book in which modern life is so admirably mirrored as it is here. It is not a story of life as it might be if human nature were different; it is not inspired by an eager enthusiasm for a remote ideal, like George Sand's stories; it is a record of various human lives, told without exaggeration and without other intention than that of showing morality. So long as novelists describe life, it is easy to see how they can well avoid discussing the conduct of life, which is morality. When carried to excess, the result is the tract; when it is ignored, the fairy-tale. When we consider the omnipresence of ethical judgment in all the affairs of life, it is not surprising that so true a realist as George Eliot should give it great prominence. Yet one consequence is, that we are disposed to shun a second reading of her novels with their grim certainty of retribution for evil-doing, as we shun the memory of any great mental struggle in our own life. The same mind avoids renewing old combats as the mature man avoids unnecessary wrestling-matches, and we choose for re-reading quiet, unagitating novels. We are always ready to turn from a world of injustice or painful justice, of failure and disappointment, to one in which the imagination loosens the chains that are inseparable from mortality. These soft novels are less important because less true, just as games are less important than action. Yet there are moments when we prefer games to performing our duty—when we prefer seeing burlesque acted to seeing Shakespeare, and had much rather read a detective story than George Eliot's novels.

In *Middlemarch* the relief from the misery of Lydgate's unhappy marriage, and everybody's money-troubles—for it was not a foolish remark of a critic that real agony comes into novels with the loss of money—is to be found in the beauty of Dorothea's character. This stands out in marked contrast to the mingled wickedness, weakness, and error that conspire to make up this tale of disappointment; and the relief is obtained, not by an exaggeration of her qualities, but by representing them in a possible combination. The very lack of success in Dorothea's life, its apparent failure in her marriage with the unheroic Ladislaw, do but prove the truthfulness of the writer. There are other rewards in life than dramatically striking husbands, and gentry of this sort have had more than their deserts in fiction.

The point about Dorothea is a relief in another way, for the tone of the rest of the book is one of despairing irony which seems to partake of the misery it describes. The irony of an earnest person is often melancholy reading, and it is not alleviated by appearing in George Eliot's novels under the form of social *badinage*. Irony requires, to be successful, absolute calm and self-repression, but she seems to chafe beneath her mask at injustice and vulgarity, and only in drawing Dorothea does she do justice to her own seriousness. The wonderful skill with which she puts her characters and their surroundings before her readers needs no praise; every one knows her unrivalled power; but the picture is depressing, except when we come across what may be called the constructive part of George Eliot's view of life as shown in Dorothea's aspirations and unselfishness. As Sainte-Beuve said of Obermann, "A force d'être ennuyé, Obermann court risque à la longue de devenir ennuyeux;" and George Eliot, by dint of being disappointed with life, came near being disappointing in her picture of it; what redeems it, however, is her exalted vision of the possibilities that lie before every human being. This is the poetical side of the realism of the present day, for it shows us what really exists, and sets it before us a commendable model. What is particularly to be noticed is the altered ethical interest which not merely

concerns itself with denouncing gross violations of what we may call the statute law of society, such as intemperance and dishonesty, but encourages attention to a subtler regard for one another's rights. A list of rules to govern life must always be meagre and, in a way, insufficient. The most difficult questions of civilized life are those of the conflict of laws, or such as are not provided for in the code, those for which the conscience is the sole arbiter. The literature of the last century concerned itself with simpler problems; it was didactic, but it taught rudimentary virtues, the observance of social laws; only later has fiction gone behind the observance of a code and busied itself with the remote foundations of character. No one, it is safe to say, has set the ethical standard higher than George Eliot. She is a profound moralist, conveying instruction by means of novels, rather than a great artist valuing her work above everything else. The very formlessness of her work shows this; she frequently combines different stories within the covers of a single book, as in *The Mill on the Floss* and *Middlemarch;* and it is further exemplified by the abandonment in her later novels of the time-honored custom of selecting a hero and heroine around which all the other characters shall revolve as dependents and inferiors. Thackeray began this change, and later writers have carried it on, for truth to nature demands that even the less important personages should have greater justice done them than is possible when the leading characters are alone of interest.

In *Daniel Deronda* we have what appears to be the author's conception of a faultless hero, who gives his name to the book, and two separate stories connected together by tolerably slender threads. That the combination is a fortunate one cannot be affirmed; the chapters on the Jews and their hopes are remote from general interest, and the book distinctly made upon its readers the impression of a failure. Yet it is a failure that was more admirable than many trivial successes, and in the character of Gwendolen, George Eliot shows all her skill and abundance of observation and imagination.

This brief record of what this writer has done the reader will supplement by recalling George Eliot's never-failing mastery of her subject, whatever the circumstances, whether terrible or delicate, in which she places her characters, and in the vividness and sympathy with which these are drawn. The conversations, too, are not, as is often the case in modern novels, examples of the author's brilliancy, but are the precise, far-reaching expression of very different individualities. Her skill as a novelist makes us impatient of her frequent appearance as a commentator on her own inventions. No novels ever stood less in need of accompanying exposition from the author than hers, and none have more of it. She makes sufficiently clear her power of moral analysis in her keen detection of motives; she leaves nothing for herself to explain, and her thoroughness is almost as terrible as remorse, as M. Scherer has well said. What redeems this is her sympathy even when she is most impartial. Her sympathy is for those who are faithful to duty, who are chilled by the indifference of society to the higher claims of life; and doubtless George Eliot profited from her own experience of what awaited those who offended the social conventionalities which are upheld with more than Mosaic rigidity.

Her poetical comprehension is more clearly marked in her prose than in her verse. Her poems have many admirable qualities, but they lack *inevitableness;* and while her novels stand out as the most important contribution to the form of literature which is the most genuine expression of the interest of the present day, her verses have an air of good work, to be sure, but such as is rather an experiment on a new instrument than the result of overmastering inspiration. The poems are interesting, as all the work of a great genius is interesting, but the reader is led on more by wondering how George Eliot will tell the story that she has to tell than by delight in the poem. Whatever merit her verses may have, their author does not sing "as the linnet sings," and many of the qualities that are aids to her novels are hindrances to her poems. The light that she throws in from all sides, her patience, her tolerance, might be properly employed in verse, as we see when we read Browning, but the rarer, indefinable essence is lacking.

Yet we should be grateful for her prose. After its long, slow development, the novel which turns its white light on society without the interference of conventionalities of form appeared in her hands as a representation and criticism of life that give it a place among the greatest instruments through which literature has spoken. We see reflected in her work not merely the image of society fifty years ago, but the hopes and interests of the best thinkers of to-day, and, possibly, what may be the truisms of fifty years hence. When the chatter of those writers whose sole claim to attention is their novelty has become silent, George Eliot's work will remain to show how a great mind regarded the rights and duties of life. She has shown what poetry there is in the commonest things, and how the great question before us all is how to live well.

(T. S. P.)

CROSS, Sir Richard Assheton, G. C. B., D. C. L., LL. D., F. R. S., a British statesman, was born at Red Scar, Lancashire, May 30, 1823. He was educated at Rugby, under Dr. Thomas Arnold, and at Trinity College, Cambridge, under Dr. Whewell. He was called to the bar at the Inner Temple in 1849, but became a banker, and sat in Parliament as a conservative, 1857–62, for Preston. In 1868 he was returned for South-west Lancashire, defeating Mr. Gladstone himself, the Liberal candidate. In 1874 he was re-elected without opposition. In that year Mr. Disraeli appointed Cross home secretary and privy counsellor, and in 1876 he was chosen a bencher of the Inner Temple. He was made a G. C. B. in 1880 on his retirement from the cabinet. Sir Assheton Cross is an able and persuasive parliamentarian, a man of firmness, industry, vigor of thought, large business capacity, and wide sympathies. He published a work on the Poor-laws (1853) and, with H. Leeming, prepared a treatise on *The General and Quarter Sessions* (1858). Questions of laws regarding education and social and sanitary reform are among the topics to which he gives special attention. He took a very prominent part in the recent legal reforms in England.

CROSS-BILL, a genus of oscine passerine birds, of the family *Fringillidæ;* the *Loxia* or *Curvirostra* of authors, prominently distinguished from all other birds, whatsoever, by having the mandibles falcate, deflected to opposite sides, and crossed at the end; constituting the condition known as *metagnathism.* Correlated with this distortion of the bill is more or less a symmetry of the whole skull and of the muscles moving the mandibles. The purpose of the struc-

See Vol. VI. p. 542 Am. ed. (p. 614 Edin. ed.).

ars in the readiness with which the birds use
gular bills in husking pine-seeds out of the
ne fruits of the coniferæ affording their usual
ncipal food. There are several species, inhab-
iefly pine woods of cold and temperate portions
northern hemisphere. The bill excepted, they
osely related to the pine grosbecks, red-polls,
e finches, and other northern *Fringillidæ* which
a ruff of feathers at the base of the upper man-
e. In all the cross-bills, the males are red of some
de, relieved or not by white; the females, dingy
ownish or olivaceous, more or less streaked, and
me extent marked with saffron or yellowish; the
oung resemble the latter. There is the greatest irreg-
ularity in the assumption of the red dress, and adult
males often vary to bronzy, coppery, or yellow. Two
North American species, well illustrating the whole,
are the common red cross-bill (*Loxia curvirostra amer-
icana*), a variety of the European; and the white-
winged cross-bill (*L. leucoptera*). In the former the
male is normally tile-red, with blackish wings and tail,
without markings; in the latter, the red is rosy or car-
mine, and the wings are twice crossed with white; fe-
males of the two may be distinguished by the latter
mark, being otherwise very similar. The length of
either is about 6 inches; the wing 3⅓, pointed; the
tail 2⅓, forked. The bills may cross indifferently on
either side, *e. g.*, the one mandible may pass either to
the right or left of the other; but whichever it is, it
is fixed for each individual. The variation in the size
of the bills is unusually great; a large-billed variety
of *L. curvirostra* from the southern Rocky Mountain
region and alpine portions of Mexico, is *L. c. mexicana*.
The cross-bills are sociable, gentle, and affectionate
birds, generally seen in flocks, which rove about ir-
regularly in winter, according to exigencies of the
food-supply and of the weather; but they are nearly
stationary in mountainous and northerly parts of the
United States. They breed very early in the spring,
or even in winter, when the trees are still leafless and
snow is on the ground, building a slight shallow
nest of twigs, rootlets, etc., on the bough of a tree;
the eggs are usually 4 or 5 in number, pale-blue,
with dark spots. The brooding parent is very gentle
and devoted to her charge, even suffering herself to be
taken in hand on the nest, and returning directly to it
when released. (E. C.)

CROSS-EXAMINATION, in law, the examination
of a witness by the party opposed to the party who
called him, and who examined or was entitled to exam-
ine him in chief. In practice, a witness is scarcely ever
cross-examined unless he has given evidence in chief.
It seems, however, that in strictness if he be sworn the
opposite party is entitled to cross-examine, even though
the party calling him has not chosen to examine him in
chief.

The power of cross-examination has been justly said
to be one of the principal and most efficacious tests
which the law has devised for the discovery of truth.
By means of it the situation of the witness with re-
spect to the parties and to the subject of litigation, his
interest, motives, inclination, and prejudices, his means
of information and powers of discernment, memory,
and description, are all fully investigated, ascertained,
and submitted to the consideration of the jury. It is
pecially in those regions where the common
wanting. It is still common on the N. Atlan
and occasionally seen in New England, and ev
New Jersey coast. It reaches high latitudes
America and Greenland, and in the opposit

counsel may upon cross-exami
bearing upon the whole case, so as to bring
of independent defence. In the United States,
Cross-examina-
tion is here confined to the subject of the examination
in chief, including, of course, all the *res gestæ*. In
some respects much greater freedom is allowed to the
counsel in cross than in direct examination. He may,
for example—and almost invariably does—put to the
witness leading questions of a kind which would un-
doubtedly be ruled out on examination in chief. This
course is often necessary in order to extract an answer
from an unwilling witness, and is sanctioned as being
in any event best calculated to promote the ends of
justice.

A counsel cross-examining a witness is also at liberty
to inquire further into collateral facts and circumstances
than is admissible in direct examination. This will
only be allowed, however, so far as to prove bias or
falsity on the part of the witness, and cannot be carried
to such an extent as to distract the attention of the
jury from the real point at issue.

In most of the United States salutary laws have been
passed enabling a party in a cause to call the opposite
party as for cross-examination. By this means all
necessity for the bill of discovery in chancery has been
done away with. (L. L., JR.)

CROTON. See AQUEDUCT.

CROW, an oscine passerine bird of the family
Corvidæ, sub-family *Corvinæ*, and genus
Corvus, the species of which are numerous,
including ravens, rooks, and daws, as well
as crows; generally distributed over the
world, excepting South America. With
a few exceptions, the whole plumage is glossy black, the
bill and feet being of the same ebony color; the wings,
which have ten developed primaries, are long and
pointed, surpassing the moderate twelve-feathered tail;
the bill is cultrate, and overhung with dense tufts of
bristly feathers directed forward, concealing the nos-
trils. The species are numerous, some fifty being de-
scribed; but owing to the uniformity of color of nearly
all of them they are difficult to determine. They fall in
two groups—the *ravens*, with the feathers of the throat
loosened, lengthened, lanciolate, with firm, distinct
edges; and *crows*, with the same feathers rounded,
blended, and soft; the former include, as a rule, the
largest species; but the unqualified terms "raven" and
"crow" do not imply specific distinctions, all ravens
being crows. The United States species may be de-
scribed in illustration of the whole genus. 1. *Corvus
corax*, the common raven, is nearly or quite the same
in America and Europe; the American bird may be
on an average, slightly larger and stronger billed, bu
the difference, when any, is slight; the name *C. co
nivorus* is applied by those who argue its distinctn
from *C. corax*. It is about 2 feet long, with a stre
of wings of 4–4½ feet; the wing 16–18 inches, the
10. The raven has been generally distributed
North America and Mexico, but has so far retired
the settlement of the country as to be now seldom
in most of the United States east of the Missi
though still abundant in the Western Territo

See Vol. VI. p. 545 Am. ed. (p. 617 Edin. ed.).

extends to Guatemala. 2. *C. cryptoleucus*, the white-necked raven, is smaller than the foregoing, and distinguished, furthermore, by having the bases of the feathers of the neck snowy white; but this white is entirely concealed except when the plumage is disturbed. It is confined to the South-west, and especially characterizes the Llano Estacado of Texas. 3. *C. frugivorus* (*O. americanus Aud.*) is the common crow of North America, distinct from the carrion crow (*C. corone*) of Europe. This well-known bird is about 19 inches long and 36 inches in extent, the wing 13½, tail 8. It inhabits temperate North America, but especially the United States, in those regions where there are no ravens, holding its own in the most populous districts by the exercise of its wits. Constantly alert to danger as it is, and subjected to endless persecution, its sagacity, wariness, and cunning have become developed to the highest degree, proving on the whole more than a match for man's ingenuity in attempting its destruction with gunpowder and poison. The injury done by the crow to the crops is certain, while the benefits it confers by the destruction of noxious insects is not so obvious; yet there can be little question that the despised and outlawed crow is not man's creditor, on fairly balancing the harm and good it does. Much depends on the time and place. The most remarkable trait of the crow is its tendency to colonize in particular districts, and form great "rookeries" or roosts, to which thousands of the birds resort regularly to pass the night, coming from many miles distant and consuming hours, each day, in making the tedious journey to and fro, to no obvious purpose. The bands disperse at earliest daybreak, radiate over the country in search of food, and reassemble at night-fall, during the whole of the year, except the breeding season. Some of these resorts have become historic in the annals of American Ornithology. There is one near the Potomac river above Georgetown, west of Washington; and during the whole afternoon, in fall, winter, and early spring, a steady stream of crows pour over Washington, always due west, and the reverse in the gray of the morning. The strong westerly winds, which often prevail in that region, greatly impede the afternoon flight, which is accomplished sometimes most laboriously by tacking and shifting. In summer, crows are generally dispersed in pairs in woodland, selecting some tall or thick tree for the nest, which is a large, bulky structure, becoming a conspicuous object when the leaves fall, but ordinarily hidden with care in the foliage. The eggs are 4 or 5 in number, dull-green, spotted and blotched with browns, purplish-grays, and neutral tints. The crow is absent from most of the treeless and uninhabited regions of the West, where the raven is specially numerous, but not as common in some parts of California. Were it protected by law, as should be done, it would probably assume some of the social habitudes of the rook. 3. *C. caurinus*, the North-west crow, is a smaller species peculiar to the Pacific coast. 4. *C. maritimus* (*C. ossifragus Wils.*), the fish-crow, is common in the Atlantic States, especially along the coast, as far north as Long Island, but rarely enters New England. This is only about 15 inches long, the wing 10½, the tail 6½; it also differs from the common crow in the relative proportions of the tarsus and toes, and, in some cases, at least, it has a naked space about the corner of the mouth. A large male fish-crow, however, is not always easily distinguished from a small female common crow. The habits are substantially the same; but the fish-crow is not known to flock to the same extent, and is especially fond of frequenting beaches, mud-bars, marshes, etc., to feed upon crustaceans, molluskS, fish, and other aquatic animals, as well as any refuse left by the tides. It is commonly found to be less shy and wary than the larger species, probably because it is not so much addicted to the farmer's grain and, therefore, less frequently molested. (E. C.)

CROW BLACKBIRD, an oscine passerine bird of the family *Icteridæ*, sub-family *Quiscalinæ*; the purple grakle. *Quiscalus purpureus*. See GRAKLE.

CROWN POINT, a village of Essex co., N. Y., is on Lake Champlain, at the mouth of Putnam's Creek. It is on the New York and Canada Railroad, at the junction of the road to Hammondville, and is sometimes called Hammond's Corner. It has 3 hotels, a bank, a weekly newspaper, 6 churches, and several schools. There are 2 large iron-furnaces, a sash- and blind-factory, and wagon-factory. The Crown Point Iron Company has a narrow-gauge railroad to its mines, 12 miles distant. Mineral phosphate of lime is also found in the vicinity. There is a light-house on the point which gives name to the place. The population consists of Americans and Swedes, and in 1880 numbered 4287. Crown Point was a noted place in American history in the eighteenth century. It was at first a trading-post between the English and the Indians, but in 1731 the French took possession of the cape and erected Fort Fédéric. This excited alarm in the neighboring colonies, and in 1755 an expedition against the fort was led by Sir William Johnson. Though successful in a battle, he did not attack the fort, but contented himself with erecting Fort William Henry at the head of Lake George. A similar expedition in the following year accomplished nothing. In 1759, when Gen. Amherst approached with a large army, the French abandoned Crown Point and joined the garrison at Ticonderoga. Amherst, who should have pushed on to join Wolfe in the campaign against Quebec, delayed here, and finally went into winter-quarters. He employed his troops in erecting a fortress, half a mile in circuit, with solid limestone walls and barracks. Although the British government spent £2,000,000 on it, the fortress was never completed. After the conquest of Canada an insignificant garrison was maintained here, and in May, 1775, a detachment of American volunteers, under Seth Warner, captured the place without difficulty. It lost its importance, though its picturesque ruins still attest its former strength.

CROWS, ABSAROKAS or UPSAROKAS, a tribe of American Indians, kindred to the Dakota race. Their ancestors inhabited the valleys of the Yellowstone, Big Horn, and Tongue Rivers. But the tribe was driven farther west by assaults of the Sioux and Northern Cheyennes. From an early date the Crows possessed horses and made marauding excursions, robbing Indians and whites alike, though carefully avoiding an open rupture with the latter. They are very expert horsemen, and are skilled hunters. They are tall and athletic, with broad features and unusually dark complexions. They are particularly noted for the extraordinary length of their hair, in which they take great pride, anointing it profusely with bear-grease. Catlin painted one whose hair was so long that it swept the ground as he walked. They have great skill in the dressing of buffalo-skins for their lodges and clothing. They succeed in making these

perfectly white, so that a Crow warrior or village can be readily distinguished. They are divided into three bands, each with a distinct dialect.

The first treaty with the Crows was made in 1825. It bound them to keep peace, and to permit traders to pass through their country. A treaty in 1851 gave the United States the right to make roads through their lands, for which right they were to be paid an annuity of $50,000 for 50 years. By the treaty of 1868 they agreed to go upon a reservation in Montana, where they now are. They as yet display little indication of assuming the habits of civilization. They number at present about 4200. They are reputed to be cowardly, but their bravery is no doubt equal to that of any other tribe. On their present reservation they are well contented and somewhat prosperous.

CROWTHER, Samuel Adjai, D.D., an African bishop, born about 1810, of a family living at Ochugu, in the Yoruba country. His native name was Adjai or Edj-ai. In 1821 he was captured by a party of Mohammedan slave-dealers, and three times sold—first for a horse, and afterwards for some tobacco. In 1822 he was released from a slave-ship by an English man-of-war, and landed at Sierra Leone. In 1825 he was baptized, taking the name of the Rev. Samuel Crowther, a well-known English clergyman. In 1827 he married a native woman, who had been taught in the same school with him, and became a mission school-teacher. He accompanied the expedition sent by the British government to explore the Niger in 1832. He then went to England, and, after studying at the Missionary College, Islington, was ordained by the bishop of London. He became a missionary at Akessa, and in 1864 he was consecrated bishop of the Niger country, having his diocesan seat at Lagos. He is author of a good account of the second Niger expedition, and of various religious writings in West African languages. He also published a Yoruba dictionary (1843 and 1852), and translated the Bible into Yoruba.

CRUCIBLES are open or covered vessels for the reception of substances to be subjected to intense heat. It is requisite that they should be able not only to withstand successfully very high temperatures, but also sudden changes of temperature and the corrosive action of certain fused substances, besides being sufficiently strong and refractory to hold securely and support the molten mass while being lifted out of the furnace. Crucibles vary in size, in form, and in the material from which they are made, in accordance with the uses for which they are intended. While some assaying crucibles are not much larger than a thimble, those intended for zincing shot are of sufficient size to hold 800 lbs. of molten metal. In form some are nearly cylindrical, some triangular with round bottom, and others skittle-shaped. For certain laboratory purposes crucibles are made of charcoal, platinum, silver, gold, or iron; the materials, however, most commonly used in the manufacture of crucibles for assaying and in the arts are certain kinds of fire-clay mixed with silica, powdered coke, burnt clay, graphite, etc.

Charcoal crucibles are best formed by making a cavity in a piece of well-burned charcoal, corresponding in size to the substance to be operated with, and providing this cavity with a charcoal stopper or cover. As charcoal undergoes considerable contraction when exposed to very high temperatures, it will be necessary to ignite the charcoal previous to using it for a crucible or a stopper, so as to avoid subsequent derangement from contraction. The charcoal vessel is afterward fitted into a common clay crucible, which last is to be well covered and luted.

Platinum crucibles are the most generally useful among metallic crucibles, and should always be accompanied by covers of the same material. They are made either with a flat bottom, meeting the sides at a sharp angle, or with a rounding bottom, making them egg-shaped. The former are peculiarly liable to injury at this angle, because the metal is usually thinner there than elsewhere; but the latter, while avoiding this disadvantage, are less convenient to handle, since they require especial supports. A platinum crucible may with advantage be inserted into a Cornish crucible, but no intervening substance should be introduced. The metal crucible is thus protected from impurities in the fuel and from the forcible action of the tongs in moving it in and out of the furnace.

Silver crucibles and their covers should be made of pure silver. They are of great use in the evaporation of mineral-waters and various solutions, but require careful attention in heating, since silver fuses at a yellow heat. Near the fusing point the metal becomes exceedingly friable and brittle, so much so that, although appearing quite sound, if held at one edge its weight is sufficient to break out a piece. Hence it is best never to use them in any other than a crucible furnace where it can be most conveniently watched.

In the application of fixed alkalis to the analyses of minerals by heat it has been found that both platinum and silver are so much acted upon by them that crucibles made of pure gold have been recommended and are used. A gold crucible is by no means liable to the same kind or extent of injury, but is very fusible in the fire.

Iron crucibles are occasionally required for experiments of ignition. Although cast-iron is far more fusible than wrought-iron, the former is preferable for crucibles.

No other furnace-fuel than charcoal should ever be used with metallic crucibles. The sulphurous fumes which rise from coke and coal injure them, and iron and other substances present do not merely form slags which adhere to the vessels and soil them, but actually corrode and destroy them.

In the use of metallic crucibles it is to be observed that fusible metals or compounds of metals likely to be reduced must never be heated in vessels of silver, gold, or platinum, otherwise alloys will be formed, the crucible destroyed, and its contents lost. They should, therefore, be used only with infusible substances in mass or powder, or with such fluids as will not act upon them.

By far the greatest number of crucibles are, however, made, as before stated, of *clay*. They possess the advantage of being cheap, and of resisting well high temperatures and the action of bodies which, from their fixedness, admit of or require the application of great heat. *Clay crucibles* are made of fire-clay mixed with silica or other infusible matter. A very common mixture consists of two-thirds of raw clay to one-third of burned clay. The celebrated *Berlin* crucibles are made of 8 parts fire-clay, 4 parts black lead, 5 parts powdered coke, 3 parts old ground crucibles. The *English crucibles* in most common use in Bi[illegible] and its neighborhood, as well as in S[illegible] made of fire-clay found near St[illegible] ture has about the foll[illegible]ring propo[illegible] clay, 2 burned-clay [illegible]

pipe-clay. These Stourbridge clay crucibles are mostly used in melting steel; they are only carefully dried, but not burned until required for use, when they are put into the melting-furnace first with the mouth downward, and when red-hot are taken out and put back again with the mouth upward.

Hessian crucibles very far surpass the English in resistance to high temperatures and to the action of fluxes. They are the cheapest and answer for all purposes where a single melting will suffice, as in refining or experiments. They come in nests of sizes from 2 to 8 inches high and are round at the bottom, but are furnished both round and triangular at the top. *Cornish crucibles* are chiefly used in assaying copper; they are made of a clay found in some parts of Cornwall. They are equally good with the Hessian crucibles in resisting high temperatures, but on softening do not become vesicular and frothy. In France an excellent crucible is made of a sort of kaolin and fine sand, and is largely used by the melters of bronze and brass in Paris. Notable among these crucibles are those of Beaufay called the *Creusets de Paris*, and those of Deyeux called *Creusets de Savegnies*. Of the crucibles thus far mentioned the Hessian and the Cornish are the most valuable for laboratory uses.

In the arts, the *blue pots* or *black-lead* crucibles find the most application. They were first made by the Dutch, in the early part of the seventeenth century, of clay and graphite, and in their day were the safest melting-pots, because they could withstand from 4 to 5 meltings and submit to considerable change of temperature before cracking.

In 1827 Joseph Dixon began the manufacture of *graphite crucibles* in the United States, by mixing graphite with a clay used by glass-makers for melting-pots. These crucibles proved superior to the Dutch blue-pots, being able to resist very great and sudden changes in temperature. In 1828 he procured the first shipment of foliated graphite from Ceylon, which was found preferable to the New Hampshire graphite, which had been used previously in making these melting-pots. About 1830 Mr. Dixon adopted the Dutch pipe-clay to mix with the Ceylon graphite. The proportion of the ultimately perfected mixture is 10 pounds of ground graphite to 7 pounds of clay, 2 pounds of fine kaolin, and 1 pound of fine quartz-sand mixed with a sufficient quantity of water to make the mass plastic enough to be turned on a potter's-wheel to the desired shape. For steel melting-pots half a pound of pulverized charcoal or coke is added to the mixture. The pots are carefully dried and then burned to a white heat in a potter's kiln, when they are ready for use. For melting brass, copper, silver, gold, or alloys of metals, a Dixon graphite crucible should run from 20 to 40 meltings, according to the fuel, draft, care, etc. For steel melting they will run from 4 to 6 times, and longer, by a systematic cleaning of the slag from the furnace after each melting, and coating the crucible with a mixture consisting of fire-clay, charcoal, and pure quartz-sand. These crucibles are made at the Dixon works, Jersey City, N J., of all sizes, from those that hold but 2 ounces up to 600 pounds capacity. Covers are made for all sizes. The crucible mixture is applied to retorts of all shapes, and different kinds of coal ware. The melting-pots are sized by numbers, the figures denoting the kilogrammes of brass they hold—thus No. 1 holds 2.2 lbs., No. 10 holds 22 lbs., and so on up to No. 300.

These crucibles are moulded on a wheel or in a press according to the requirements of size and material. Special machines are also employed for this purpose, prominent among which is one designed by T. V. Morgan. In use crucibles should be placed in the fire, not on it. The fire should surround the crucible to the very top, and a blast, if used, should not strike the crucibles direct. They must be kept in a dry place, as dampness is most injurious to them. If they are thoroughly well made they need no annealing before use—the purpose of this operation being merely to complete shrinkage, which ought, however, to have been accomplished in "burning" by the maker of the crucible.

The use of crucibles in the arts and sciences was well known to the ancients, as is attested in Egyptian paintings, and by the reference to them made by Greek authors. (A. F. H.)

CRUIKSHANK, GEORGE (1792–1878), an English artist, was born in London, Sept. 27, 1792. His father was of Scotch birth and was an artist of some repute as a political caricaturist. The son developed artistic talent at a very early age, and received his only instruction as a draughtsman and etcher from his father, who employed him as an assistant. As he was ambitious to engage in work of a higher class he applied for admission to the classes of the Royal Academy, but was rebuffed by Fuseli, who was the master in charge. It was perhaps fortunate that he did not succeed in entering as a student at the Royal Academy, for the instruction at that time was such as would probably have cramped his inventive faculties and limited his originality. There was, it is true, a certain kinship between his genius and that of Fuseli, but it may be doubted whether the elder artist would have sufficiently appreciated the strong qualities of his pupil to devote himself to their proper development. After the death of his father, George and his brother Robert industriously devoted themselves to the support of their mother and sister by illustrating children's books and making comic valentines and political caricatures. When Cruikshank commenced his career caricatures were very potent weapons of political attack and defence, and his ready invention, facility of hand, and satirical humor caused him to be much sought after for designs of this class. A series of plates, entitled *Life in London*, which he executed in conjunction with his brother Robert, obtained great popularity. This series enjoyed the dubious honor of being dramatized at several of the minor theatres, and it was followed by another series entitled *Life in Paris*. Shortly after this an opportunity was afforded Cruikshank by a series of illustrations to the Brothers Grimm's collection of German stories, to develop the finer side of his genius. Cruikshank was at his very best in dealing with fairy themes, especially those in which the element of the grotesque predominated. No artist has ever surpassed him in designs of this class. The *Point of Humor*, which has been praised as one of his most characteristic works, appeared about this time, and was followed by illustrations of familiar English and Irish life, and by a vast number of plates. The best known and most important, from an artistic point of view, are those illustrative of *John Gilpin*, *Tom Thumb*, *Sketches by Boz*, *Oliver Twist*, *Jack Sheppard*, *The Tower of London*, *Windsor Castle*, Fielding's, Smollett's, and Scott's novels, *The Fairy Library*, and the *Life of Grimaldi*. The designs furnished by Cruikshank to the texts of Dickens, Ainsworth, Fielding, and Smollett are among the most carefully executed and most truly expressive

that ever came from his hand. The boisterous and generally coarse humor of *Tom Jones*, *Roderick Random* and other works of Fielding and Smollett, was an inspiration to him, and the plates made for these novels were, in the most liberal sense of the word, illustrative. The designs made for the *Sketches by Boz* are very much better than the text; while in *Oliver Twist* author and artist fairly went hand in hand. The representation of Fagan in the condemned cell, which belongs to the *Oliver Twist* series, is justly celebrated as one of Cruikshank's most powerful designs. But little if any inferior to this is the one representing Bill Sikes attempting to destroy his dog after the murder, while the episode of Oliver asking for "more" owes its fame quite as much to Cruikshank as it does to Dickens. *Oliver Twist* is, however, certainly Dickens' book, for Cruikshank was as incapable of writing such a text as Dickens was of designing such a set of illustrations. Cruikshank quarrelled with Dickens during the progress of this work, and never afterwards collaborated with him; and the probabilities are that, as he aged and continued to nurse his grudge against the novelist, a sense of the importance of his share in the making of the story grew upon him. The controversy, however, never would have become of consequence had Dickens and his friends pursued a moderately discreet course.

The plates made for Ainsworth's archæological and very labored novel of *The Tower of London* are esteemed to be among the best ever made by Cruikshank. The fine ladies who figure in them, like all the fine ladies drawn by Cruikshank, resemble in shape the figures in a child's Noah's ark rather than the women of nature's make, and the designs have an abundance of other technical faults. For the rest, the most important of them are intensely realistic, with their realism tempered by as characteristic grotesqueness rather than by any higher quality. The representation of the burning of Underhill on Tower Green, and that of the execution of Lady Jane Grey, have elements of the disgusting in them—as all attempts to treat such subjects in a spirit of uncompromising realism must have—but there is no denying their power. That which depicts the execution of Northumberland is marvellous on account of the manner in which an immense crowd of people has been described on a few square inches of surface; while the one in which the executioner is shown in the act of testing the edge of the axe which he is engaged in sharpening is as grewsome a design as ever proceeded from the hand of its maker. The workmanship on these plates is very fine indeed. Cruikshank's work as an etcher has been warmly and justly praised. Cruikshank's method was admirably simple and direct, but he was not the master of effect that some etchers have been. In the *Tower of London* series of plates, for example, peculiar and striking effects have been aimed at in a number of instances. These designs are all of them excellent so far as they go, but while all of them are carried far enough to reveal plainly the artist's intention none can be regarded as entirely adequate treatments of their themes.

In 1847 Cruikshank became a total abstainer, and from that time he was an enthusiastic advocate of the temperance cause, and made a great number of plates having for their object the exposition of the evils of strong drink. Of these the most celebrated are the eight comprising the series entitled *The Bottle*. These designs have had an enormous popularity, and, in addition to being dramatized, they have been many times reproduced on both sides of the Atlantic.

During the last years of his life Cruikshank devoted much time and attention to painting in oil- and water-colors, and he was a frequent exhibitor at the Royal Academy and elsewhere. His most important composition in oil was a large picture called The Worship of Bacchus. Among his other paintings may be mentioned Tam o' Shanter, Titania and Bottom, Cinderella, The Runaway Knock, Grimaldi Shaved by a Girl, and Disturbing a Congregation.

The number of designs made by Cruikshank has never been computed. In 1840 Thackeray expressed his astonishment at his indefatigability and at the enormous amount of work which he had performed, while, during the greater portion of the remaining thirty-eight years of his life he was as industrious and as fertile as he had been previously. Cruikshank was fond of attending and presiding at temperance meetings. He was a member of a volunteer rifle-company, before he was of age, and always maintained his connection with the citizen-soldiery; for several years before his death he was lieut.-colonel of the Forty-eighth Middlesex Rifle Volunteers. His histrionic talents were of a high order, and he frequently assisted in private theatricals, and occasionally acted in public for charitable purposes. He died Feb. 1, 1878.

(W. J. C., JR.)

CRUMMELL, ALEXANDER, D. D., an American clergyman, of African descent, was born in New York city, about 1820. His father, though a slave, was the son of a king or chief of Timanee, near Sierra Leone. Alexander was sent, in 1835, to an academy at Canaan, N. H., but a mob soon after drove the colored students from the place. Crummell's education was continued at the Oneida Institute, N. Y. He was ordained a deacon in the Protestant Episcopal Church by Bishop Griswold, and a presbyter by Bishop Lee, of Delaware. He afterwards entered the University of Cambridge, in England. For many years he was a missionary in Liberia, where he was also a college professor. He afterwards returned to the United States, and became rector of St. Luke's Church, Washington, D. C. He published *The Greatness of Christ and Other Sermons* (1882.)

CRUSÉ, CHRISTIAN FREDERIC, D. D. (1794–1865), an American Episcopalian minister and author, was born in Philadelphia in 1794. Having graduated at the University of Pennsylvania in 1817, he studied theology, and was ordained as a Lutheran minister. Some years later he entered the Protestant Episcopal Church, and was ordained by Bishop White. In 1831 he became assistant professor in the University of Pennsylvania, but resigned in 1833 and removed to New York. He was associated with the educational efforts of his friend and classmate, Rev. Dr. W. A. Muhlenberg, teaching in Flushing Institute and in St. Paul's College, Flushing, L. I. He afterwards held several pastoral cures, and was librarian of the General Theological Seminary of the Episcopal Church, New York. The last three years of his life were spent in the home of his friend, Dr. Muhlenberg. He died in New York, Oct. 5, 1865. He was well versed in ancient and Oriental languages, and received the degree of D. D. from the University of Pennsylvania in 1838. His principal work was the translation of the *Ecclesiastical History of Eusebius* (Phila., 1833), w[illegible] ar[illegible] translation, and has been re[illegible] Dr. Crusé added to [illegible] a Council of Nice. [illegible] *Classical Manual* (P[illegible]).

CRUVELLI, SOPH[illegible] G[illegible]

Biele, Prussia, March 12, 1826, being the daughter of a Protestant pastor named Cruwell. At the age of thirteen she was taken to Paris to study under Permarini and Bordigni. After some years she proceeded to Milan where, following the directions of Lamperti, she prepared for a first appearance on the lyric stage, which took place in the autumn of 1847, her name being given in the Italian form, which she henceforth used. Cruvelli then proceeded to London, and became a member of Mr. Lumley's company. Although only eighteen years of age (Jenny Lind being then the reigning favorite) Cruvelli succeeded fairly well, and then returned to her native country. From Berlin she went to Trieste, and appeared in operatic parts requiring great versatility. In 1850 at La Scala, in Milan, Cruvelli made her first really great success. In the spring of the same year she made her first appearance in Paris, and created great enthusiasm in that highly critical capital. The following year she went to London for the second time, and there made a profound impression in Beethoven's *Fidelio*. In 1854 she returned to Paris and gave so remarkable an impersonation of the part of Valentine in *Les Huguenots* that the composer wrote the part of Selika in his *L'Africaine* specially for the display of her artistic powers.

After eight years of public life as a singer she married Baron Vigief, of Paris. Cruvelli's voice was not remarkably fine at first, but under judicious cultivation it became a clear soprano with beautiful chest-tones. Her acting was much above the average of that of great operatic singers, and therefore she could not fail to find in the part of Leonora, by Beethoven, great opportunities for the exercise of her special gifts and acquirements. Her power of expressing despair and hope, hatred and love, resolution and hesitation, and the feeling of rapturous joy, enabled her to make a profound impression in this character. Cruvelli's chief faults were those of exaggeration and unbridled demonstration; but these and similar defects, which called forth adverse criticism, at the same time generated enthusiasm among passive or otherwise indifferent spectator-auditors.

CUBA, which Columbus, on discovering it in Oct., 1492, regarded as "the most beautiful land that eyes ever beheld" (*la mas fermosa tierra que jamas ojos vieron*), lies at the outlet of the Gulf of Mexico, between 74° and 85° W. long. and 19° 50′ and 23° N. lat. It is the largest of the West India islands; its greatest length is 760 miles and its greatest breadth is

See Vol. VI. p. 599 Am. ed. (p. 678 Edin. ed.).

es, but the average breadth is 80 miles. Its
ly 40,000 square miles, and with the ad-
g nds amounts to 42,000 square miles. Its
pe harbors and bays are Bahia-honda, Cabañas,
nel, Havana, Matánzas, Cárdenas, Sagua la Grande,
, Nuevitas, Manati, Puerto Padre, Gibara,
Nipe, Levisa, Tánamo, and Baracoa on the
, and on the south Guantánamo or Cumberland
or, Santiago de Cuba, Manzanillo, Casilda, and
or Cienfuegos. The latter is one of the most
harbors in the world, both for area and
water, yet s ller than the bay of Nipe,
embraces 65 o miles of deep water. There
nd keys about the northern and
coast. Late in the year 1511
Gue. who had been appointed to
n the neighboring island of
300 Spaniards, and landed
h was soon conquered and became the starting-point for the conquest of Mexico. The progress of its settlement, development of its resources, and course of its affairs generally, are recorded in the ENCYCLOPÆDIA BRITANNICA. But an important royal decree concerning Cuba, addressed to its governor-general under date of May 28, 1825, has been omitted by several who have given a history of the island. Faithfully translated into English it reads as follows:

"His Majesty, the King, our Lord, desiring to obviate the inconveniences which might result, in extraordinary cases, from a division of command, and from the interference of powers and prerogatives of the respective officers; for the important end of preserving in that precious island (Cuba) his legitimate sovereign authority and the public tranquility, through proper means, has resolved in accordance with the opinion of his council of ministers to give to your excellency the fullest authority, bestowing upon you all the powers which by the royal ordinances are granted to the governors of besieged cities. In consequence of this His Majesty gives to your excellency the most ample and unbounded power, not only to send away from the island any persons in office, whatever be their occupation, rank, class, or condition, whose continuance therein your excellency may deem injurious, or whose conduct, public or private, may alarm you, replacing them with persons faithful to His Majesty, and deserving of all the confidence of your excellency; but also to suspend the execution of any order whatsoever, or any general provision made concerning any branch of the administration, as your excellency may think most suitable to the royal service."

This decree has been and continues to be the fundamental law of government in Cuba. At the close of the year 1825 the island contained a population of 715,000, divided as follows:

	Males.	Females.	Total.
White	175,000	150,000	325,000
Free colored	63,000	37,000	100,000
Slaves	170,000	120,000	290,000

The taxes levied on the island for that year amounted to $5,722,198, which the people paid, unconscious of their having just been placed under martial law. Harmony among them was heartfelt until General Tacon, who, being one of the Spanish officers that survived defeat in the war of independence of the colonies of Spain in South America, came over to Cuba and assumed command in 1834, according to appointment of the home government. During his term of office as captain-general he was as severe with the native Cubans as he was lenient with the old Spaniards, who only were appointed to offices of profit or honor under the government. Such a policy worked out a breach between Cubans and Spaniards wide enough to prevent their combining against misrule. Taxation grew heavier from year to year, and Cuban persecution increased, now by summary expulsion of suspected parties, now through trial of other parties by court-martial under the royal decree above quoted; whilst on the other hand the slave-trade continued to flourish between Africa and Cuba to the great advantage of the Spaniards, who controlled that trade, and who, in the face of their enormous profits from it, did not complain of the growing taxation. The most remarkable instance of Cuban court-martialling occurred during the year 1844, when, in consequence of the report of a plot among the African slaves of the sugar plantations about Matanzas for a rising against the white people, several officers of the permanent military commission at Havana for the trial of political offences were de-

tailed to form a court-martial under the presidency of Brig.-Gen. Salas, at Matanzas, in order to trace out the reported plot and punish the culprits. Many persons were arrested and closely examined, but as by the usual mode of examination no clew to the alleged plot was found, the prosecution determined to resort to torture, the unwilling witness being flogged while stretched face downward on a ladder. This process of eliciting evidence, first applied to African slaves, was soon extended to free-colored creoles, and then into the circle of white people. The subjoined table shows the number of prisoners tried and how they were disposed of:

Result of trial.	Slaves.	Free Colored.	Whites.	Aggregate.
Shot, (including 1 slave female)..	39	38	1	78
Condemned to hard labor (10 years).....	202	126	.....	328
Condemned to hard labor (1 to 8 years).....	303	345	4	652
Condemned to hard labor (1 to 6 months).....	38	272	2	435
Banished.....	.....	433	2	435
Consigned to service in charitable institutions (including 10 females).....	.....	27	.....	27
Sentenced to lighter penalties...	8	1	5	14
Discharged.....	193	955	82	1,230
Total.....	783	2,197	96	3,076

Out of the aggregate number of prisoners on trial 1846 were found guilty and punished, besides a large number of similar prisoners untried, who perished in the plantations during the proceedings. These iniquitous proceedings were later on followed by a revolutionary movement in Central Cuba to liberate the island under the leadership of Gen. Narciso Lopez, who, in consequence of detection, fled to New York, where a goodly number of Cuban exiles joined him during the year 1848 to forward his plans for the liberation of Cuba, with a view to annexation to the United States. His attempt to sail for that island in 1849, at the head of a few hundred men, was baffled by the United States Government. Yet, renewing the attempt in the subsequent year and mustering his forces outside the United States, he sailed for Cuba in command of more than 600 men. He landed at Cárdenas on May 19, stormed, captured, and held that place together with its governor and garrison, but evacuated it at dusk and re-embarked to land somewhere else in the island. But the expeditionary steamer "Creole," while steaming out of the harbor, got aground and only floated after a large quantity of war materials had been thrown overboard almost in sight of a Spanish man-of-war that chased her to Key West, where the expedition was disbanded. During the summer of 1851 partial risings of the people in Central Cuba caused Lopez to hasten from New Orleans to their aid, at the head of about 450 men, by the steamer "Pampero." The expedition landed on Aug. 12 at a point called Playitas, some 30 miles to the west of Havana. Gen. Lopez then detailed 130 picked men, under the command of Col. Crittenden, of Kentucky, to bring up the expeditionary baggage, and marched at the head of the main body of his forces inland. But soon both Lopez and his lieutenant were engaged by heavy odds. Crittenden confronted manfully the enemy, only to find his command cut down to 50 men without arms and ammunition. These were en prisoners to Havana, where all of them were shot.

Meanwhile Gen. Lopez continued to fight from day to day at the head of his devoted band within a large circle of troops shutting out all help from the surrounding country, until a severe tropical storm swept away his scanty supply of arms, ammunition, and provisions. Then his forces scattered and wandered through the woods without food till they fell prisoners. Lopez was taken to Havana and executed there September 1st, but his surviving followers were pardoned. Born in Venezuela and but a lad at the outbreak of the war of independence of his native land, he was induced to fight on the side of Spain, where after the close of that war he continued his military career, attaining the rank of a major-general by gallantry in many a field. The troops hurled against him in his short Cuban campaign aggregated about 7000, of which over 1500 were reported killed and disabled, including Lieut.-Gen. Enna, who had the chief command. As nearly all the coadjutors of Lopez, both in Cuba and the United States, survived him, some two years after his death they renewed their efforts for the liberation of the island in concert with Gen. Quitman, of Mississippi. Large sums of money were raised and remitted to the United States for arms and ammunition, as well as vessels to convey them. The men enlisted at numerous places in Western Cuba were to rise simultaneously in arms on the arrival of Gen. Quitman in the island at the head of a strong force conveying the requisite war materials for the contemplated movement. But early in the year 1855 the leaders of that movement were betrayed and thrown into prison. Gen. Quitman then abandoned the attempt, and all was lost. Two of the most prominent leaders in Cuba were executed at Havana under court-martial proceedings, and the others, to the number of about 80, were retained in prison to be disposed of at the pleasure of the government. This event was succeeded by a lull, during which Cuba became quite prosperous. Her agricultural resources were considerably developed, particularly as regards sugar-cane, which, at the close of the year 1860, grew in 1365 estates, embracing an area of 59,447 "caballerias" ("caballeria" being a Cuban measure of land containing 33⅓ acres), according to the statement published by Mr. Charles Rabello with Spanish official approval, as follows:

	Total. Estates.	Caballerias.		Crop in 1860.
		Sugar-cane.	Other Lands.	Tons.
Western Department...	1,065	19,250	26,826	462,098
Eastern Department....	300	1,507	11,864	49,436
Aggregate.....	1,365	20,757	38,690	511,534

Many of the estates enumerated in the foregoing table improved the cultivation of their soil and the process of their sugar-making by the introduction of suitable implements and machinery; while their aggregate number increased from year to year to the advantage of the planters and the benefit of the country at large. But leading Cubans still endeavored to have the political condition of their native land ameliorated through pleading. They kept on their endeavors till the home government signified a willingness to hear their plea. Then several Cuban gentlemen well versed in the affairs of ir country were commissioned to wait upon that vern nt, which heard them but granted nothi to ameliorate the political status. Sma appoint-

ment the commissioners returned home during the year 1867. Shortly thereafter the people of Central and Eastern Cuba met in their respective departments and decided to assert with force the rights denied them through pleading. They concerted a plan between the two departments for a rising as soon as their organization to that effect was completed. But before completion Charles M. de Cespedes, a lawyer of Bayamo and one of the leaders of the movement in Eastern Cuba, rose at Yara, Oct. 10, 1868, at the head of 128 men wretchedly armed, to the surprise of his coadjutors, who, however, supported him, and in a few weeks that handful of men became a body of about 15,000 resolute fighters, though badly armed. After setting forth in their Declaration of Independence, then issued, the grievances which constrained them to rise in arms against the authority of Spain over Cuba, they went on to say: "And as Spain has many a time promised us Cubans to respect our rights without having hitherto fulfilled her promises; as she continues to tax us heavily, and by so doing is likely to destroy our wealth; as we are in danger of losing our property, our lives and our honor under further Spanish domination; as we have reached a depth of degradation unutterably revolting to manhood; as great nations have sprung from revolt against similar disgrace after exhausted pleading for relief; as we despair of justice from Spain through reasoning, and cannot longer live deprived of the rights which other peoples enjoy, we are constrained to appeal to arms to assert our rights in the battle-field, cherishing the hope that our grievances will be a sufficient excuse for this last resort to redress them and secure our future welfare." As soon as their warlike movement was fairly started they framed a political constitution providing for a republican form of government with a chamber of representatives. It provided also among other subjects for the immediate abolition of slavery within Cuban territory. That constitution was duly proclaimed April 10, 1869, at Guaimaro in Central Cuba, where the chamber therein provided for was then organized, and where at the same time that chamber proceeded, according to constitutional provision, to elect Cespedes president and Francis V. Aguilera, of Bayamo, vice-president of the republic of Cuba. Thereupon the president-elect took the oath of office and appointed his cabinet and foreign commissioners with the advice and consent of the chamber. Of the members of the cabinet only the secretaries of state, war, and interior had immediate duties to perform.

From the outbreak of this insurrection to the close of the year 1870 the fortunes of war favored the Cubans in their struggle for freedom and self-government. They worsted the enemy in almost every field and drove him to his fortified positions on the seaboard and elsewhere, but could not make further headway from want of sufficient war materials. During this period they received from their agents abroad only a few thousand stand of arms (mostly old style Springfield or Enfield pattern), and but a comparatively small supply of ammunition; while their enemy had his numerous troops equipped with the best approved weapons of the United States, and kept the island surrounded by many war-vessels, of which the most efficient to prevent any outside help to the struggling Cubans were 30 light-draft steam-gun-boats built in New York expressly for Spain, which kept in-shore around Cuba. Nevertheless the insurgents held their own throughout more than half of the island, while their force aggregated probably 50,000 able-bodied men. But out of that number hardly one-fifth were properly armed, their arms and munitions having to a great extent been taken from the enemy. Most of those who were operating in the large district of Camagüey in Central Cuba, despairing of war materials from abroad, signified to the enemy early in 1871 a readiness to lay down their arms, provided their lives were spared. Being answered that on surrender they should be pardoned, their surrender commenced at once, and soon Gen. Agramonte, who was the Cuban chief commander in Camagüey, was left with 35 men, but determined, however, to remain in the field. On being asked on what he relied to prosecute the campaign, he curtly answered: "On dignity!" He was as good as his word, for through unremitting efforts he succeeded in raising a fine body of cavalry which restored Camagüey to the insurrection, and which rendered otherwise excellent service not only under his command but also under the leadership of his successor. Agramonte fell dead at their head at the very moment of routing the enemy after a protracted engagement in the spring of 1873. While such was the course of affairs in struggling Cuba, where fresh troops from Spain had been taking the field to cover the heavy losses, and where the Cubans had in their turn suffered severely, riotous and murderous proceedings kept the western department wrought up to a high pitch of excitement. Indeed shortly after the breaking out of the insurrection the old Spanish residents of the towns throughout that department began to organize themselves into battalions of volunteers, each battalion under the command of a colonel, who in almost every instance happened to be a wealthy slave-trader, for the Havana corps, which mustered about 20,000 men. But the volunteers under arms in Western Cuba preferred remaining as home guards to do garrison duty, while their countrymen of the regular army were gallantly confronting the insurgents in the field. Their first feat at arms at Havana was to fire volley after volley upon the main entrance of a theatre and on the people as they came out at the end of a play performed, it was supposed, for the benefit of the insurgents, the performers being Cubans. Many persons were killed and wounded. Shortly thereafter, while out on parade, they fired into a saloon and again killed several persons. Their next exploit was an assault upon the residence of a prominent Cuban gentleman, who happened to be with his family away at the time in one of his sugar estates, fortunately for their personal safety; but their rich household goods were destroyed at the hands of the assailants. Later on they deposed Capt. Gen. Dulce and constrained him to return to Spain smarting under the indignity offered him and the home government, which had appointed him only a few months previous to his lawless deposition. But his government put up with the outrage perpetrated on him, and this emboldened the volunteers, who soon deposed also Brig.-Gen. Lopez-Pinto from the governorship of Matanzas, and began to turn out in force through the country, where many harmless people were killed by them. Hundreds of Cubans were torn from their families and shipped off by the government under volunteer escort to distant penal colonies of Spain. A greater outrage ensued. In November, 1871, 43 medical students of the University of Havana were arrested and subjected to trial by court-martial at the suit of the volunteers. The cause alleged therefor was that these boys while at the general cemetery had scratched

the glass plate of a vault containing the remains of a volunteer. The trial ended in the acquittal of the defendants, through manly pleading for them by an educated officer of the Spanish army; but the volunteers called upon the captain-general for a new trial by court-martial composed of regular army and volunteer officers. He complied once more with their wish by ordering a court of five army with nine volunteer captains and a major of the army to conduct the prosecution under the presidency of an army colonel. These officers, organized into a court-martial, soon condemned eight of the unfortunate students to death; while their remaining companions, with the exception of four of them sentenced to imprisonment for six months, were consigned to hard labor. On the following day, November 27, 15,000 volunteers turned out under arms and the death-doomed boys were shot by a detachment from that force. This heinous deed produced general consternation in Western Cuba, and elicited a burst of indignation throughout the United States. Even the Spanish Parliament execrated the Havana volunteers, but required no atonement for the crime.

During 1871 the insurgents received but a scanty supply of arms and ammunition; they then determined to get war materials by assaulting the enemy wherever such materials could be had. Success crowned their efforts so well that at the close of the subsequent year they had on hand a pretty good supply of arms and ammunition for the campaign of 1873, which was the most active of the war, particularly in Eastern Cuba under the able command of Gen. Calixto Garcia, and in Camagüey under the leadership, first of gallant Agramonte, and next of his veteran successor. But during the last quarter of that year the Cuban chamber, which had been in recess for a long time, met at Bijagual in Eastern Cuba, and deposed President Cespedes, who was succeeded *ad interim* in his office by the chairman of that body, Salvador Cisneros, better known by his title of Marques de Santa Lucia. Shortly thereafter the steamer Virginius, a regularly documented American vessel, conveying a supply of arms and ammunition for the insurgents, was captured by a Spanish cruiser in sight of Jamaica and taken to Santiago de Cuba, where 53 of the passengers and crew were slaughtered. Their remaining companions, to the number of some 130, would have shared the same fate but for the sudden appearance there of the British sloop-of-war Niobe, under Commander Lorrain, who peremptorily required the governor of that place to stop his bloody work. This affair brought the United States to the verge of war with Spain, but it was averted through diplomatic negotiations which ended in the surrender of the Virginius, together with its surviving passengers and crew, by Spain to the United States. In February, 1874, ex-President Cespedes, who, since his deposition, had retired to San Lorenzo in the mountains of Eastern Cuba, was, while alone, surprised by a detachment of the enemy, but manfully confronted them till he fell lifeless. He was a high-minded and stout-hearted man, and had shown remarkable executive abilities since the outbreak of the insurrection, but seldom, if ever, agreed with the assembly that deposed him. During 1874 fresh troops from Spain took the field by thousands, the Spanish forces having sustained very heavy losses in the preceding year. But towards the close of spring of 1875, owing to further losses in battle, or in hospital from the effects of the climate, the remaining Spanish forces were compelled to fall back on their fortified positions. A lull ensued in the insurrectionary districts, with the exception of Camagüey and Eastern Cuba, where the insurgents attacked every now and then Spanish columns escorting heavy trains of war materials and provisions, which the former generally wrested from the latter. But meantime partisan strife raised its hideous head among the struggling Cubans. However, the campaign was vigorously carried on with varying fortunes on both sides until late in the spring of the following year, when the Cuban forces, reduced to hardly 5000 men, scattered in bands of a few hundred men each. But even these thinly scattered forces were enabled by their mighty ally, the climate, to cause the Spanish troops severe losses by steadily harassing them. Such losses were, nevertheless, amply covered with 25,000 men arrived from Spain during the subsequent autumn under the leadership of Gen. Martinez Campos, who some time before had been duly appointed to the chief command of the Spanish forces against the Cuban insurgents, whose mode of warfare was quite familiar to him from his having fought them in the earlier years of the insurrection. He deployed his troops as he deemed best for a decisive campaign. But seeing them frequently baffled in Eastern Cuba and constantly harassed in Central Cuba to considerable falling off in their ranks, at the close of spring in the year 1877, he resorted to negotiations with insurgent chieftains to bring the war to an end. Success rewarded his efforts, for early in the year 1878 an armistice was agreed to between the belligerents in Camagüey, where the seat of the insurgent government was at the time, and where the Cuban chamber of representatives held a session to consider the overtures of Marshal Campos for peace. The chamber appointed a committee of nine members to wait on Gen. Vicente Garcia, who had been recently chosen President of the tottering Republic of Cuba, and arrange for a meeting, which took place shortly afterwards at Zanjon, in the district of Camagüey. There appeared on the part of Spain Marshal Campos, with a few general officers of his staff, and on the part of Cuba President Garcia, with the committee above mentioned. At that meeting the remaining insurgent forces in war-torn Cuba capitulated to the restoration of peace throughout the island in February, 1878. During the contest just outlined, which raged without quarter on either side, despite the best Cuban efforts from the outset for an exchange of prisoners, the Spanish losses aggregated 8000 officers and 200,000 privates killed in battle and died in hospital from the effects of the climate, as recorded in the war office in Madrid. By adding to these figures some 15,000 troops left in Cuba after the capitulation above pointed out, and 34,000 Cubans under the command of Marshal Campos at the time of that capitulation, according to his personal statement, it will be seen that the forces which Spain gradually pitched against the insurgents aggregated 257,000 men, besides about 50,000 volunteers then and still organized in the island. The number of Cubans killed in battle, and otherwise, is variously estimated at from 40,000 to 50,000. The outlay on both sides amounted to some $300,000,000 raised in Cuba, the great bulk of it being for the Spanish side. The value of property destroyed by the insurgents and confiscated by the Spanish government aggregated quite as many millions of money. The bravery and endurance of the Cubans arrested public attention, as they were not only destitute of clothing and provisions, but also badly armed against heavy odds well equipped and appointed; while the Spanish troops

elicited the admiration of every one who observed their courage and steadiness at war in a climate as deadly to themselves as genial to their active enemy. Though in the earlier years of the contest Cuban belligerency engaged the attention of Congress more than once, it was not recognized by the United States government. But several of the Spanish-American republics recognized Cuba as a belligerent power, among them Peru, which shortly afterwards acknowledged the independence of that island.

The following tables, showing the population of Cuba in 1867, 1869, 1877, 1879, afford means of important comparison:

Census Tables.

		Males.	Females.	Aggregate.
1867	White persons	491,512	341,645	833,157
	Free colored people	121,708	126,995	248,703
	Colored slaves	203,412	141,203	344,615
	Total	816,632	609,843	1,426,475
1869	White persons	423,604	373,992	797,596
	Free colored people	116,402	122,525	238,927
	Colored slaves	217,300	145,988	363,288
	Total	757,306	642,505	1,399,811
1877	National whites	522,719	383,763	906,482
	Foreign whites	6,523	3,054	9,577
	Coolies at large	21,833	57	21,890
	Ditto under contract	25,197	29	25,226
	Free colored people	128,853	143,625	272,478
	Colored slaves	112,192	86,902	199,094
	Total	817,317	617,430	1,434,747
1879	White persons	569,640	396,095	965,735
	Free colored people	141,800	146,027	287,827
	Colored slaves	89,517	81,570	171,087
	Total	800,957	623,692	1,424,649

According to these tables the average population of Cuba at the beginning of October, 1868, and end of February, 1878, was respectively as follows, viz.:

	Whites.	Free colored.	Slaves.
October, 1868	819,822	245,050	351,617
February, 1878	963,430	273,757	196,760

Therefore, if the official figures are correct, the white and free colored population increased 17.52 and 11.71 per cent. respectively; whilst the slave population decreased 44.04 per cent. during the insurrection—a strange result, particularly as regards the free colored people, whose increase ought to appear in proportion to the decrease of the slaves, unless a large number of the latter perished in that war. But the fact is that after formal proclamation by the Cubans in arms of their political constitution declaring "all the inhabitants of the Republic of Cuba to be absolutely free," the Spanish government issued a decree July 4, 1870, setting free every child born of a slave mother in the island after that date, and granting freedom to such slaves as had helped or would help the Spanish troops against the Cuban insurgents. The same decree provided also for the freedom of every slave sixty or over sixty years old, and gave rise to the law promulgated Feb. 13, 1880, for the gradual abolition of slavery, which, under the working of that law, shall be finally extinguished towards the close of the year 1887. Shortly after peace was restored, as above stated, Marshal Campos assumed command of Cuba as its Captain-General. Pursuant to his unlimited authority from the king, he proclaimed at once freedom of speech and the press, which gave rise to lively discussions of public matters in mass-meetings and through the newspapers. Then followed a royal decree dated June 9, 1878, entitling Cuba to elect to the Spanish Parliament one representative for every 40,000 white and free colored inhabitants. By another decree of that same date the island was divided into six provinces. A further decree was issued June 21, 1878, providing for provincial and municipal laws, which were at once enacted and duly supplemented with the requisite election law promulgated on August 16, 1878. The following table gives the statistics of these provinces in 1880:

	Area in sq. miles.	Population.	Judicial districts.	Municipalities
Pinar del Rio	5,117	200,000	3	25
Havana	2,842	450,000	12	33
Matanzas	3,165	260,000	5	22
Santa Clara	7,891	315,000	6	29
Puerto Principe	9,495	65,400	2	5
Santiago de Cuba	12,123	203,500	6	15

In 1887 the total population was 1,521,684, including 977,992 native Spanish and creoles, 10,632 white foreigners, 43,811 Chinese coolies, and 489,249 negroes and mulattos. The population of Havana was 198,271.

In each of the provinces the administration of its affairs is committed to an assembly elected by the people, and a governor appointed by the home government according to the provincial law above referred to, the same governor being a general officer of the army, and the province entitled to three representatives for every one of its judicial districts pursuant to that law. But no province shall elect more than 20 nor less than 12 representatives, the former number being allowed to the most thickly peopled districts. As soon as the provincial representatives are duly elected they meet and proceed to name by ballot three candidates from amongst themselves to have one of them chosen president of the assembly by the governor-general, who may, however, according to the aforesaid law, discard the ternary candidacy and choose any other member of that body to preside over it. Then the assembly chooses a vice-president and appoints two secretaries to keep a record of its sessions. Next the provincial governor selects five assemblymen and sends their names to the governor-general for him to appoint them as the provincial committee required by the law. That committee acts as a consulting body whenever called upon for an opinion on provincial affairs; decides all questions on municipal elections, and performs duties of the assembly during recess of the latter subject to the approval of the same assembly as soon as it meets again. The vice-president of this committee is appointed from amongst its members by the governor general at the suggestion of the provincial governor, who may, whenever it suits his pleasure, preside, with a right to vote, over any sitting of the same committee, or of the assembly.

The provincial representatives are elected for the term of four years, but one-half of them is replaced every two years by new representatives. Their biennial elections take place during the first fortnight of September. They assemble together at the capital of their respective provinces on the first working day of the fifth and tenth month of every fiscal year. If during the time of their assemblage anything should

happen likely to render their deliberations dangerous, it shall be the duty of the provincial governer to prorogue the assembly and report at once to the governor-general, who is, on the other hand, fully authorized to suspend any of the provincial assemblies in a body from its functions and report immediately to the home government, whenever in his judgment public order shall require such suspension. According to the municipal law above referred to, the smallest number of inhabitants entitled to local self-government is 500, who may elect five aldermen. But the latter are gradually increased in proportion to population up to 20,000 inhabitants, who are entitled to 21 aldermen. Then one alderman is added for every 2000 inhabitants up to 30, which is the maximum number of aldermen in any of the larger municipalities. Their election takes place during the first fortnight of the eleventh month of the fiscal year, one-half of them being replaced every two years by new incumbents. The aldermen name by ballot three candidates from their own body to have one of them chosen mayor by the governor-general, who may, however, ignore the ternary candidacy and appoint as mayor any citizen outside the corporation. The provincial governor may, with a right to vote, preside at pleasure over any sitting of the board of aldermen. This board takes the census within its jurisdiction every five years and levies municipal taxes. The same board meets in common council, with as many tax-payers as there are aldermen, to take into consideration the taxes levied, the decision of that council being final. In fact, the municipalities help considerably their respective province to carry on local government. Both the provincial and municipal laws refer in several instances to the council of administration, composed of 12 councillors appointed by the home government to advise the governor-general on all administrative questions requiring his decision. The public discussions above referred to brought about two political parties: one known as conservative and the other as liberal. The former is composed of old Spaniards, with their ranks considerably swelled by members of the volunteer organization above noticed. The latter is organized by Cubans, but includes also some intelligent and well-informed old Spaniards. Their leaders are bright-minded men, distinguished for their ability, both as public speakers and vigorous writers; whilst their antagonists are not so well gifted or accomplished, but use greater boldness to attain their aims, particularly at the elections, which they generally carry, and become thereby enabled to control the provincial administration. The conservatives have the support of the government, but the liberals are left to shift for themselves within the law, which is frequently stretched to prosecute and silence their journals. Indeed, according to the press law dated April 7, 1881, and promulgated in Cuba early in the ensuing May, every editor or manager of a daily or weekly journal must send, duly signed by him, two copies to government headquarters, and two other copies of its issue, as soon as printed, to the district attorney, for him to see whether any objectionable remarks are contained therein. In several instances liberal journals have been suspended from publication for many weeks and their editors fined according to their respective degree of delinquency under the press law. That law, which contains numerous articles defining transgressions against itself, holds sacred the royal family and form of government under the Spanish constitution.

Cuba has two high courts: one in Puerto Principe, with jurisdiction over that and the adjoining province of Santiago de Cuba; the other in Havana, with jurisdiction over the remaining provinces. But the governor-general is above either court, as appears from a royal decree dated June 9, 1878, defining his duties and prerogatives. According to that decree, he is the commander-in-chief of the army and navy in Cuba, as well as the highest authority in every other respect over the island. Hence his power not only to overrule any decision at a meeting of all the superior authorities, including the justices of the court of judicature, under his presidency, but also to withhold the execution of any order or resolution of the home government "whenever he may deem it best for the public interests."

Religion and Education.—Cuba is divided into two dioceses, which are the archbishopric of Santiago de Cuba, containing 55 parishes, and the bishopric of Havana, containing 144 parishes. Education is still much neglected. The chief educational institutes are the Havana University, two professional schools with meteorological observatories attached, one agricultural school, and two seminaries. There are several private as well as public schools, aggregating in all about 1300 institutions, with over 40,000 students and scholars. The length of railroads in 1890 was about 1000 miles, and of telegraph lines some 3000 miles.

Products.—The yield of sugar and molasses for the crop-year, 1888–89, was 544,300 tons of sugar, 98,860 tons of molasses. This showed a large falling off, due to a cyclone, which widely prostrated the canes. The chief difficulty in Cuban sugar culture seems to be a scarcity of colored field hands, though this has been largely obviated by a rise of wages in 1889, which attracted many laborers from the neighboring islands. The yearly product of tobacco is given at 300,000 bales, of which the larger portion is exported. In 1888 Havana exported nearly 220,000,000 cigars. Of late years mining interests have made encouraging progress in Cuba. Iron and manganese ores are being extensively mined by two American companies near Santiago de Cuba.

Finances.—The existing debt of Cuba is stated to be about $186,000,000, with an annual interest of about $9,000,000. The annual income of the inhabitants is given at $800,000,000, subject to a tax of about $34,000,000, as given in detail below. These taxes are collected with great difficulty. The estimated budget for 1888–89 makes the receipts 25,622,967 pesos; the expenditures 25,614,494 pesos (the peso being valued at 92.6 cents). The American trade with Cuba is as follows: Exports to the United States in 1888, $50,208,414; imports, $10,990,400.

The taxes levied on Cuba by the Spanish Parliament for the fiscal year ending July 1, 1884, amounted to $34,269,410, to meet disbursements according to the following details:

"General Obligations"	$12,075,999.02
Department of Justice	1,020,504.02
War Department	9,625,378.18
Treasury Department	1,823,223.01
Navy Department	2,204,677.96
Department of the Interior	5,730,966.50
Department of Public Works	1,036,812.00
Department of State	616,160.20
Penal Colony of Fernando Po	37,160.00
Aggregate	$34,170,880.89

Under the head of "General Obligations" appear $468,000 for civil and military pensions; $918,500 for military, civil, and naval officers on the retired list; $97,175 for the colonial department, including salary of the minister; and $10,115,420 for interest and instalments on the public debt. The appropriation to the department of justice includes $379,757.52 for the clergy and church in Cuba. Among the items of expense in the war department are $5,000 for pensioned military decorations, and $200,000 for the volunteer organization in the island. The expenses of the department of the interior include $50,000 for salary of the governor-general, $708,848.72 for police service, and $2,537,119.09 for the pay of foot and mounted gendarmery. Of the two items making up the total amount of the state department, one is for $121,300 to pay salaries and defray office expenses of nearly the whole diplomatic corps and consular body of Spain in America, excepting the United States, while the other item is of $494,860.20 to meet outstanding claims, pursuant to final decision of the Mixed American and Spanish Commission in Washington. The revenue corresponding to the total outlay includes $2,300,000 for taxes on city real estate; $2,150,000 on commerce, industry, arts, and professions; $1,100,000 on cattle and swine at the slaughter-house; $11,400,000 for duties on foreign importations; $6,466,200 duties on exports; and $3,334,820 net gain from the "Royal Lottery." During that year there were 29 lottery drawings, and the amount realized out of the sales of tickets therefor reached $13,317,320, according to official statement. Out of this amount $9,982,500 have been applied to payment of prizes drawn, leaving the gain above pointed out. According to the government reports the forces garrisoning Cuba are 22,866 officers and men of the regular army and 12 vessels of the navy. The same reports show that the foot and mounted gendarmery aggregate 5076 officers and men in the island, while the Havana police number 767 men. The total amount of revenue exceeds the disbursements above set forth by $98,529.11, and therefore this balance must have been left in the national treasury if Cuba paid in full, which, however, is questionable. Her impoverished condition has been frequently urged by her representatives upon the attention of the Spanish Parliament without avail. These representatives are 24 congressmen and 12 senators, who, though supported by 12 congressmen and 6 senators from the sister island of Porto Rico, are utterly powerless on any Cuban measure put to a vote in that Parliament. (P. G.)

CUCKOO, any bird of the family *Cuculidæ*, order *Picariæ*. The American cuckoos are all different from any of the old world, not only in species and genera, but in subfamilies. They are most numerous and diversified in the warmer parts of America. There are some twenty-five or thirty species of the genera *Crotophaga*, *Guira*, *Geococcyx*, *Dromococcyx*, *Diplopterus*, *Saurothera*, *Piaya*, *Morococcyx*, and especially *Coccygus*, which has the largest number. None are regularly parasitic on other birds, like cuckoos of the old world; but some occasionally drop their eggs in other birds' nests, or destroy the eggs and young of other birds, and many are known to be irregular in nidification, or oviposition, or both. North America alone possesses representatives of three subfamilies of *Cuculidæ*. I. *Crotophaginæ:* see ANI. II. *Saurotherinæ*, ground cuckoos. Although the feet are zygodactyle, the toes being arranged in pairs, two before and two behind, as in all the family, the birds of the family are fitted for terrestrial habits by the size and strength of the feet, and run with great rapidity. The ground cuckoo, chaparral cock, road-runner or *paisono* (*Geococcyx californianus*), is one of the most notable birds of the south-western territories of the United States, from Texas to California. It is nearly two feet long, the tail a foot or more, narrowly fan-shaped, of ten tapering graduated feathers; the wings short, rounded, concave-convex; the bill about as long as the head, stout, tapering, decurved at the end; the tarsus longer than the toes, scutellate before and behind; the head crested; a naked space about the eye; most of the feathers of the head and neck bristle-tipped. The coarse plumage is bronzed greenish, blue on the crest, variegated with whitish or buff; the under parts soiled white, but the fore-neck streaked with black and tawny; the tail-feathers with broad, white tips. The paisono is noted for its surprising swiftness of foot, which taxes a horse in a race. It feeds upon reptiles, crustaceans, insects, and various seeds and fruits. It nests in bushes, building a large shallow structure of sticks, and lays numerous pale greenish elliptical eggs, the peculiarity being that these are gradually deposited, incubation taking place before the full complement is laid, so that fresh eggs and others in various stages of development may be found together with young birds. A second, smaller species (*G. affinis*) occurs in Mexico and Central America. The West Indian species of *Saurothera* belong to the same sub-family. III. *Coccygina*, tree cuckoos, including the great majority of the genera and species. The leading genus is *Coccygus*, with eight or ten species, three of which inhabit North America, two of them reaching Canada, the other confined to Florida. They share the peculiarity of egg-laying noticed above, and the nidification is substantially the same; eggs are occasionally dropped in alien nests, but such is not the rule. The yellow-billed cuckoo (*C. Americanus*) is the commonest species, often known as the "rain-crow," its reiterated, uncouth cry of "cow, cow, cow," being thought a sign of falling weather. The plumage is peculiarly silky, quaker-color above, milk-white below; the wings are extensively suffused with cinnamon-brown; the lateral tail-feathers black, with large white tips; the bill black and yellow. This bird is 11 to 12 inches long, the pointed wings 5 to 5½, the graduated tail 6 to 6½, the bill stout, decurved. The black-billed cuckoo (*C. erythrophthalmus*) resembles the last, and is of the same size, but the bill has but a trace of yellow, if any; the skin about the eyes is red and bluish; the wings are scarcely suffused with rufons, and the tail-feathers are less strongly marked. The habits and general distribution are the same; both are migratory birds of the woodland of the United States east of the Mississippi, and feed chiefly upon insects. The mangrove cuckoo (*C. seniculus*) resembles the yellow-billed, but is pale orange-brown below instead of white, and the auriculars are dusky-gray: the size is about the same. This is a West Indian species, only a visitor to Florida. (E. C.)

See Vol. VI. p. 605 Am. ed. (p. 685 Edin. ed.).

CUDLIP, ANNIE THOMAS, an English novelist, known to literature as Annie Thomas, and as Mrs. Pender Cudlip, was born at Aldborough, Suffolk, Oct. 25, 1838. She came of an Irish family of distinction, named Thomas, and her mother was a relative of Lord Reay. Among Mrs. Cudlip's most successful stories are *Sir Victor's Choice*, *Barry O'Byane*,

Denis Donne, *Theo Leigh*, *Walter Goring*, *A Narrow Escape*, *The Two Widows*, *High Stakes*, and *A London Season*. She is a prolific writer, of high moral purpose; her tales are principally of the class called society novels. In 1867 she was married to the Rev. Pender H. Cudlip.

CUFFEE, PAUL (1759–1817), an American negro navigator and philanthropist, was born at Westport, Mass., in 1759. His father, John Cuffee, a native African, though a slave in Massachusetts, purchased his own freedom, and bought a farm of 100 acres, upon which he lived respected by all, and reared a family of four sons and six daughters. His wife, Ruth Moses, was one of the Nantucket tribe of Indians. Paul was the youngest son. At the death of his father, 1774, the care of the family devolved upon the sons. The land was poor, and the struggle for existence was bitter. With little help Paul learned to read and write, and acquired a fair knowledge of arithmetic. In two weeks he mastered the general principles of navigation. At sixteen he shipped as a green hand on a whaling vessel. On a voyage to the West Indies he was captured by a British cruiser, and was kept a prisoner, in New York city, for three months. For the last two years of the Revolutionary War he remained at home assisting his brothers on the farm. In 1780 the negro population of Massachusetts were denied the right of suffrage, though taxed. Paul Cuffee, though not yet twenty years of age, had felt the spirit of liberty, by reason of his voyages and experience. He induced his brother John to join him and others in a petition, Feb. 10, 1780, to the General Court for the right of suffrage. The petition was refused at that session, but granted in 1781, and ultimately affected the legal status of all persons of African descent in that State.

Beginning about 1781–2 with an open boat, manned by himself, he became master, and owner, in turn, of a schooner, a brig, and a ship. He made voyages to Russia, England, and the West Indies. In 1806 he was not only an experienced navigator, possessed of much landed property, houses, and stores, but in addition he owned a ship, two brigs, and several smaller craft. With increased wealth Cuffee developed the proper spirit of using it. He had earned the title of navigator and merchant by his numerous voyages; he now aspired to add to these the higher one of philanthropist. Mindful of his early disadvantages, he erected at his own expense a school-house at Westport, hired a teacher, and opened the school, the only one in the neighborhood, to the public. In the winter months he taught navigation to his own sons and those of his neighbors in the same building.

It is a matter of tradition that many of the early seamen of the Elizabeth Islands, Nantucket, and Martha's Vineyard, were taught navigation by Captain Paul Cuffee. He had early joined the Society of Friends, and became a minister in that religious body. In accordance with their principles he never dealt in liquor or slaves, at that time fruitful sources of New England wealth. The discussions at the formation of the Union (1789), and the failure to abolish the slave-trade, led to discouraging views for his race in the United States. He was familiar with Mr. Thornton's scheme (1787) for founding a colony of free blacks in Africa; also with those of Rev. Dr. Hopkins (1789), Fairfax, of Va. (1790), and Rev. Dr. Stiles (Yale Coll.). In 1811 he sailed for Sierra Leone in his own vessel, the Traveller, manned by a colored crew, his nephew, Thomas Wainer, being the captain. He was kindly received there, and soon won favor with the whites and blacks. He instituted the "Friendly Society of Sierra Leone," which is still in existence. Being invited to visit England by the leading members of the African Institution, among whom were Clarkson, Wilberforce, and Strange, in August, 1811, Paul Cuffee, with his black crew, arrived at Liverpool, England, where they were cordially treated, Cuffee himself being the recipient of especial attention. He visited London twice, and was commissioned by the African Institution to carry goods to Sierra Leone. Upon reaching the United States, Cuffee corresponded with the leading negroes of his day in New York, Boston, Philadelphia, and Baltimore, with a view of forming associations for trade and settlement in Africa. The plan was well thought of, and promised success. When the war of 1812 began, he went to Washington to solicit the aid of Congress, and was well received, but the fact that his ground of operations lay in the domain of English territory prevented, at that time, any active co-operation. While the war lasted, he devoted himself to correspondence and the perfection of his plans. In the fall of 1815 he sailed again for Sierra Leone with thirty-eight negroes, eight of whom paid their own expenses, the first emigrants from America to Africa, most of them coming from Boston. Cuffee had so successfully worked up his plan that he had some 2000 names enrolled, when sickness and death finally overtook him. In his zeal Cuffee exceeded the limit set by the African Institution, and was obliged, on arriving at Sierra Leone, to provide from his own funds nearly $4000 for the support of the extra number he had brought. When the American Colonization Society were preparing to select a site for a colony in Africa, Rev. S. J. Mills, their agent, sought Paul Cuffee, whom he found upon his death-bed. He had then been sick over five months, keeping up, however, an extensive correspondence, at home and abroad, on African migration. He died, Sept. 7, 1817, a few days after Mr. Mills' interview. His death was the occasion of many eulogies, in which his character, labors, and talents were clearly and fairly stated.

He was industrious, temperate, of the strictest integrity, eminently successful in business, charitable and public-spirited. In manner he was unassuming, dignified, and grave, partaking of the characteristics of the Society of Friends among whom he was reared. Judge Bushrod Washington said of him, "I cannot forbear a momentary tribute of regret to the memory of a man to whom Africa is indebted for a vindication of her capacity for moral and intellectual improvement, and the world for an illustrious example of disinterested benevolence." (R. T. G.)

CULIACAN. A city of Mexico, capital of the State of Sinaloa, on the Culiacan River and the Sinaloa and Durango Railway, about 200 miles W.N.W. of Durango. It is 43 miles by this railway from Altata, a port on the Pacific Ocean near the Gulf of California. It has a beautiful situation, a genial climate, and is surrounded by a fertile country, in which gold and silver mines have been opened. It is the literary and educational centre of North-western Mexico, and the seat of a Bishop's College and of the National College of Rosales. Culiacan has a large cathedral, a costly mint, a newspaper-office, a cotton-factory, a sugar-mill, and a fine public square. The climate from October to May is said to be perfect, and the temperature is always above the freezing-point. The Spanish settlement of this place was founded by Nuño de

Guzman, in 1532, near the site of the Aztec city of Huicolhuacan. Population about 12,000.

CULLEN, PAUL (1803–1878), an Irish prelate and cardinal, was born in the county Kildare, April 27, 1803. He had been dedicated to a religious life, and was early sent to Rome to be educated for the priesthood. Soon after his ordination he was made professor of Hebrew in the College of the Propaganda, and afterwards he became rector of the Irish College at Rome. During the revolutionary movements of 1848 he had charge of several colleges, which he saved from disturbance by the republicans. On the death of Archbishop Crolly, of Armagh, in 1849, the suffragen bishops being divided as to the choice of a successor, Pope Pius IX. appointed Dr. Cullen primate of all Ireland. The new archbishop, consecrated in February, 1850, abandoned the conciliatory policy of his predecessor, and set himself in opposition to the plan of national education, which had for some time prevailed in Ireland. At the synod of Thurles, held in August of that year, he succeeded after an animated struggle in securing, by a majority of one, the condemnation of the national schools and of the Queen's colleges, then recently established. He thus prepared the way for the foundation of a Catholic university, to which he devoted himself with great energy. That he might more effectually carry out this scheme, he was, in 1852, after the death of Archbishop Murray, transferred from Armagh to the more important, though less dignified, see of Dublin, being at the same time made delegate apostolic for life, and thus retaining his place at the head of the Irish hierarchy. The Catholic university was opened in Dublin, in 1854, under the presidency of Rev. Dr. J. H. Newman, who, however, soon relinquished that position. Archbishop Cullen introduced and firmly established changes in the ecclesiastical system of Ireland, by which the former independence of the parish priests was destroyed, and bishops were no longer elected by the clergy. He discountenanced the interference of the clergy in political affairs, and steadily opposed secret societies, as well as the mixed system of education. In June, 1866, he was made a cardinal priest, being the first Irishman who attained this dignity. He had always been noted for his ultramontane views, and in the Vatican Council, in 1870, he warmly supported the declaration of papal infallibility. After the death of Pope Pius IX., in February, 1878, Cardinal Cullen left Ireland to attend the conclave, but on account of ill-health was unable to be present at the election of Leo XIII. He returned to Dublin, and died there Oct. 24, 1878. He was austere and even ascetic, and was especially noted for his ability and success as an administrator.

CULLUM, GEORGE W., an American general, was born Feb. 25, 1809, in New York City. He graduated at West Point, 1833, and was promoted to the corps of engineers, in which arm of service he rose to the rank of colonel. He was engaged for many years in the construction of fortifications and other public works at Boston, New Bedford, Newport, New London, New York harbor, West Point, and North and South Carolina. Among these public works were Fort Sumter and other defences of Charleston, and the New York assay office. From 1848 to 1855 he was instructor of practical engineering in the U. S. Military Academy. At the beginning of the Civil War he was aide-de-camp to Lieut.-Gen. Winfield Scott, and upon his retirement (Nov. 1, 1861) was appointed a brigadier-general of U. S. volunteers. Being assigned as chief of engineers and chief of staff to Maj.-Gen. Halleck, he was engaged in establishing defensive works in the Department of Missouri and Division of the Mississippi, directing at Cairo, Ill., operations auxiliary to the Western armies in the field, and served as chief of engineers in the campaign and siege of Corinth, and after its evacuation in fortifying its approaches. When Gen. Halleck became general-in-chief he continued at the head of his staff and directed numerous engineer operations for the defence of places. He served on many military boards, and was appointed (Sept. 8, 1864) superintendent of the U. S. Military Academy at West Point. Nov. 24, 1866, he became a member of the board of engineers for fortifications for the defence of the territory of the United States. For faithful, meritorious, and distinguished services in the rebellion he received three brevets, and, being over sixty-two years of age, was retired, Jan. 13, 1874, from active service. On the day of his retirement he was elected vice-president of the American Geographical Society, and Nov. 12, 1880, became president of the Geographical Library Society of the city of New York. He is the author of the *Biographical Register of the Officers and Graduates of the West Point Military Academy* (3 vols. 8vo), *Systems of Military Bridges* (1863), *Campaigns and Engineers of the War of 1812–15 against Great Britain*. He has also published various military memoirs and geographical papers, and translated and edited Duparcq's *Military Art and History* (1883).

CULPEPER, or COLEPEPER, THOMAS, LORD (d. 1688), a colonial governor of Virginia, was the son of John Colepeper, who was made Baron Colepeper of Thoresway, England, in 1644. He was one of the grantees of the territory of Virginia, and in 1669 purchased the exclusive right to the land lying between the Potomac and the Rappahannock rivers. In 1673, King Charles II. granted to him and the earl of Arlington the whole of Virginia for thirty-one years. In 1675 the king gave him a further commission as governor of the province for life. Culpeper, however, remained in England till 1680, when the king insisted on his assuming his duties. He caused the governor's salary, heretofore £1000, to be doubled, and the duties on tobacco and other merchandise to be placed under the exclusive control of the king. In return for these concessions made by the assembly, he brought a general amnesty for past offences in the province. In a few months he returned to England, while the people groaned under their burdens, and some of them endeavored to put a stop to tobacco-planting by violence. Culpeper came back to the province in 1672, hanged the leading "plant-cutters," and then, with the king's consent, debased the currency and took away the privilege of appeal from the governor and council to the assembly. Returning to England in 1683 in violation of his orders, he was prosecuted and deprived of his office and patent, yet he was allowed an annual pension of £600 for the remaining time of his original grant. He was mercenary, despotic, and cruel, entirely indifferent to the interests of the colony. On his death, in 1688, his vast estate in Virginia descended to his daughter Catharine, Lady Fairfax.

CUMBERLAND, a city of Maryland, county-seat of Allegany Co., is on the north bank of the river Potomac (North Branch), at the mouth of Wells Creek, 178 miles W. of Baltimore. It is on the main line of the Baltimore and Ohio Railroad, at the junction of its Pittsburg Division, and is a terminus of the

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Cumberland and Pennsylvania and the George's Creek and Cumberland Railroads, and of the Bedford Division of the Pennsylvania Railroad. The Chesapeake and Ohio Canal extends hence down the Potomac to tide-water, at Washington, D. C., while to the north-west extends the old National Road. Here the Potomac is bridged. The chief public buildings are a city hall, a court-house, jail, and a fine hotel. The public schools are five in number. The town has 3 national banks, 2 daily and 4 weekly newspapers, 15 churches, 2 academies (1 Catholic), gas- and water-works, a hospital, 2 convents (1 Ursuline, 1 Sisters of Mercy), a house of Capuchins, and an academy of music. It is chiefly a manufacturing town, but it also is the point of shipment for the excellent steam and blacksmith coal which is mined near by. The manufactures include lumber, furniture, sash, doors, castings, flour, tobacco, pipes, etc.; and there are five glass-works and a rolling-mill. The surrounding scenery is very fine. Population in 1870, 8056; in 1890, 12,007.

CUMBERLAND GAP is a narrow pass in the Cumberland mountains, near the dividing line between Kentucky and Tennessee, 50 miles N. of Knoxville, Tenn. The Cumberland range is about 1300 feet high, and the gap is about 450 feet deep; in parts it is just wide enough for a single roadway. West of the gap there are others, among which the principal are, Baptist, Rogers', and Big Creek; but these are very difficult to pass, and are very infrequently used. For 150 miles to the east there are no passes in the range. Cumberland Gap was of great strategic importance during the civil war. When occupied by a Union force, it severed the communication between the Confederate armies in the east and west; and when it was in Confederate hands it kept the Federal forces out of East Tennessee. In 1861 it was garrisoned by the Confederate Gen. Stevenson with about 13,000 men, who strongly intrenched it with earthworks and rifle-pits. The Union Gen. G. A. Morgan, with about 12,000 men, arrived at Cumberland ford in April, 1862, and formed his plans for taking the gap in the rear, but deceived the enemy by demonstrations in front, while at the same time Gen. Buell made a diversion towards Chattanooga. Morgan then passed unobserved through Rogers' Gap, which the enemy had considered impracticable, first with one brigade, speedily followed by two more. He reached Powell's Valley on the south side of the mountain range, June 11, a few of his troops having also passed through Big Creek Gap. Thus threatened by numbers in his rear, Gen. Stevenson evacuated the gap June 18, and Morgan entered without resistance. For two months he was in unmolested possession, but in the summer of 1862 the Confederate Gen. Bragg made a strong advance northward, in connection with a supplementary corps under Gen. Kirby Smith, and, marching towards the Ohio, threatened Cincinnati. In doing so he moved by the eastern route from Chattanooga and Knoxville. Gen. Stevenson now marched upon Cumberland Gap in front, while Kirby Smith made a demonstration in rear, and Morgan was in danger of being cut off from the north. The place was no longer tenable: indeed hemmed in by these forces Morgan must have surrendered, had not Kirby Smith been obliged to fall back to procure supplies. Morgan, who had held out for some time on short rations, then evacuated the gap, destroying everything he could not carry away, and set out on September 17 on a march of 250 miles to the Ohio. The enemy harassed his rear: he was in want of supplies, and often of water; but he conducted the retreat so skilfully that he reached the Ohio on Oct. 4 with 10,000 men, 400 wagons, and 20 guns. The gap was at once occupied and newly strengthened by the Confederates, who held it for a year, but incident to the movements around Chattanooga under Gen. Grant and the occupation of Knoxville by Gen. Burnside, it was easily taken again by the Federal troops under Gen. Shackelford Sept. 4, 1863. Further events and the progress of the Federal arms caused it to lose its strategic importance. In January, 1864, Lieut.-Gen. Grant inspected the gap, amid winter snows, on his journey from Knoxville to Louisville, to have personal knowledge of its value, should it again enter into the strategy of the war. (H. C.)

CUMBERLAND PRESBYTERIAN CHURCH, an American branch of the Presbyterian family, arose out of differences between the ministers of the Synod of Kentucky, of the Presbyterian church, on the questions of revivals of religion, the education of the ministry, and the doctrines of the Westminster Confession of Faith. The name Cumberland came from the Cumberland Presbytery, in that Synod to which the men who organized the new church belonged.

History.—During the early years of the nineteenth century a revival of religion prevailed through portions of Kentucky and Tennessee embracing what was known as the Cumberland country. This region had been rapidly peopled by immigrants from Virginia and the Carolinas. There were few churches and fewer ministers of the gospel, and coldness characterized the preaching and lives of many. Infidelity and wickedness prevailed to an alarming extent.

The Rev. James McGready, who had been for years a member of the church, and a candidate for the ministry in the Presbyterian church, was converted and became a very zealous preacher, making special effort to awaken the formalists in the church. It was mainly through his labors that the revival began which has become known as the "revival of 1800." This spiritual awakening spread over the Cumberland country, then embraced in the Transylvania Presbytery of the Presbyterian Church. The earnest, pointed preaching of Mr. McGready very naturally excited great opposition from both infidels and formal church-members. At one place his pulpit was burned, and a letter, written in blood, warned him against continuing. Soon after this he became a pastor in the bounds of Transylvania Presbytery. Two parties were formed in this Presbytery, which became known as the revival and anti-revival parties, and ultimately the revival party formed what has become the Cumberland Presbyterian Church.

Through the great immigration into the valley of the Cumberland, and the interest awakened by the revival, the demand for preachers and religious instruction became much greater than the supply. Institutions of learning were scarce; there were, indeed, none of high grade in the country, and the rapidly growing communities could not wait on the slow and uncertain work of a few schools in distant States. Men who could not go East and take a classical course of study became impressed with the duty of preaching the gospel to the multitudes ready to receive it. The Rev. David Rice, then the oldest Presbyterian mi r in Kentucky, knowing the pressing d for the means of grace, recommended who appeared to possess talents and a exercise their gifts publicly be chosen t the gospel, although they might not have degree of

education required by the Book of Discipline." The Transylvania Presbytery was divided in sentiment as to what should be done, and hesitated, but finally yielded to the wants and petitions of the people and by a small majority licensed a number to preach without a classical education. They justly claimed this as one of the "extraordinary cases" provided for in the *Form of Government* (sec. vi., chap. 14). Against this, protest was entered by those not in sympathy with the revival and the matter was brought before the Synod.

In 1802 the Synod of Kentucky divided Transylvania Presbytery and formed a new one, calling it Cumberland. The new Presbytery having a majority that favored the revival work and measures, received the probationers licensed by Transylvania Presbytery without a classical education. Cumberland Presbytery having charge of the work within its own bounds, licensed and ordained some men not classically educated, who gave evidence of aptness to teach, to supply the many new churches which the revival had formed.

During the controversy about the revival work there had sprung up a much more serious difficulty in the form of dissent from some of the doctrines of the Westminster Confession of Faith, such as unconditional election and reprobation, and a limited atonement. A number of men licensed and ordained by Cumberland Presbytery were allowed to "except the idea of Fatality" which they believed taught in the doctrines of Decrees and Election as expressed in chap. 3 of that Confession. Out of this "unsoundness of doctrine," "adopting the confession with reservations," grew divisions that ultimately led to the organization of the Cumberland Presbyterian Church.

The liberty granted probationers to "except the idea of fatality" when adopting the Westminster Confession was strongly opposed by the anti-revival party, and by it the matter was brought before the Synod of Kentucky. At the meeting of the Synod in 1804 all the members of the Cumberland Presbytery were cited to appear at its next meeting. The members of the Presbytery did not obey the citation on the ground that the Synod did not have authority for such action under the constitution of the Presbyterian Church. The Synod, at its meeting in 1805, appointed a "commission with synodical powers" to which the whole matter of the Cumberland Presbytery was referred. The commission met with the Presbytery and proposed to re-examine members already ordained, but the Presbytery felt that even a "commission with synodical powers" had no authority for such a course and would not submit its members for re-examination. The commission made two specifications against the Presbytery: "1st. Candidates in their licensure and ordination had been permitted to adopt the Confession of Faith with reservations. 2d. The literary qualifications required by the discipline had been dispensed with."

The Presbytery having refused to submit the men it had licensed and ordained to be re-examined, the commission resolved to prohibit all the men licensed and ordained by Cumberland Presbytery from "preaching, exhorting, and administering the ordinances," and the older members were cited to answer to Synod for refusing to allow the re-examination. The members of Presbytery in sympathy with the revival work, after consulting together, determined to disregard the acts and demands of the commission as in violation of their rights, and, so far as they might be able, to go on with their work. The Synod in 1806 suspended some of the members of the Presbytery for refusing to submit the young men for re-examination by the commission, and dissolved Cumberland Presbytery and attached some of its members to Transylvania Presbytery, leaving out those who "excepted the idea of fatality" in adopting the Westminster Confession of Faith. The ministers and probationers thus cut off, not by their Presbytery but by the Synod, formed themselves into a council and made various efforts to secure a redress of their grievances, appealing to both the Synod and the General Assembly. Failing in this after four years of effort, Rev. Finis Ewing, Rev. Samuel King, and Rev. Samuel McAdow, in Dickson co., Tenn., on Feb. 4, 1810, united in organizing an independent Presbytery to which they gave the name Cumberland, after the one with which they had been connected, and which had been dissolved four years previous. After constituting this Presbytery, it ordained Ephraim McLean, who had been licensed by the old Cumberland Presbytery. This was the origin of what is now the Cumberland Presbyterian Church.

The new Presbytery met March 20, 1810, and ordained two more probationers of the old Cumberland Presbytery. It adopted the Westminster Confession of Faith, with the provision that probationers ordained might "except the idea of fatality" as they had been permitted to do in the old Presbytery. Covering the doctrinal differences between the new Presbytery and the mother church, it adopted the following: "All candidates for the ministry who may hereafter be licensed by this Presbytery, and all probationers who may hereafter be ordained by this Presbytery, shall be required, before licensure and ordination, to receive and adopt the Confession and Discipline of the Presbyterian Church," except the idea of fatality that seems to be taught under the mysterious doctrine of predestination. It is to be understood, however, that such as can clearly receive the confession without an exception shall not be required to make any. Moreover, all licentiates, before they are set apart to the whole work of the ministry or ordained, shall be required to undergo an examination on English grammar, geography, astronomy, natural philosophy, and church history. It will not be understood that examinations on experimental religion and theology will be omitted. The Presbytery may also require an examination on all or on any part of the above branches of literature before licensure, if they deem it expedient."

This was the position of the new organization, until in 1813, when the first Synod was formed, and to which the name Cumberland was given. At this first meeting of the Synod a committee was appointed to prepare a Confession of Faith, Catechism, and Form of Government. It also adopted a brief doctrinal statement, giving the points of dissent from the Westminster Confession, which was given in Buck's *Theological Dictionary* (3d ed.). This gave these points: "(1.) That there are no eternal reprobates. (2.) That Christ died not for a part only, but for all mankind. (3.) That all infants dying in infancy are saved through Christ and the sanctification of the Spirit. (4.) That the Spirit of God operates on the *world;* or, as co-extensively as Christ has made the Atonement in such a manner as to leave all men inexcusable." These points make plain to all what was meant by "excepting the idea of fatality."

Under the preaching of these doctrines the revival of 1800 was perpetuated, and was, in fact, transferred to the church founded on them in the wilderness.

The new organization had a rapid growth. The Synod continued the highest court until 1828, when it was decided to form a General Assembly. The vote was between a delegated Synod and a General Assembly, there being 20 votes for the Synod and 67 in favor of the Assembly. The first General Assembly met in Princeton, Ky., May 19, 1829. The new church then had 4 Synods and 18 Presbyteries, 16 being represented in the first General Assembly. These were from Tennessee, Kentucky, Alabama, Illinois, Indiana, Missouri, and Arkansas. The early records are quite meagre, and but little attention has been given to statistical reports. A complete report from all of the churches and Presbyteries has never been made. The stated clerk of the General Assembly, in his report for 1884, with incomplete reports from 16 Presbyteries, made the following showing: Synods, 27; Presbyteries, 117; ordained ministers, 1505; licentiates, 249; candidates, 214; congregations, 2462; ruling elders, 9373; deacons, 3104; additions during the year on profession of faith, 9960; by letter, 3395; total in communion, 122,240. Churches of this order are now found in Western Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Tennessee, Kentucky, Georgia, Alabama, Mississippi, Louisiana, Arkansas, Texas, Indian Territory, Iowa, Missouri, Nebraska, Kansas, Colorado, California, Oregon, and Washington Territory.

The doctrines of this church make it liberal, and its ministers labor freely and earnestly with all evangelical Christians, and much of their labor has gone to build up other denominations. At first its ministers were excluded from the pulpits of the mother church, but a more liberal spirit soon prevailed, and it has long been in fraternal correspondence with the other Presbyterian bodies. A number of efforts, through committees appointed by their respective General Assemblies, have been made to effect a union between it and the mother church, but without success. Its essential doctrine, that Jesus died for all men in the same sense, could not be surrendered, and until this is fully and clearly accepted by other Presbyterian bodies, no union can be accomplished.

The Cumberland Presbyterian Church has been an earnest friend of education. As early as 1827 a college was chartered and located at Princeton, Ky., with Rev. F. R. Cossit at its head. In 1845 Cumberland University, at Lebanon, Tenn., was donated to the church, and a department of theology was opened, with Rev. Richard Beard, D.D., at its head, in 1854. Up to the outbreak of the civil war, this institution was in a very flourishing condition, having from 400 to 600 students, and extending its influence all over the South and South-west. The war destroyed its buildings and its endowment, but with the return of peace the university resumed its work. Its Law School still stands at the head in the South. The alumni of the Law School number 1000, and from these have come many of the leading lawyers and statesmen of the South. The other institutions of the church are Waynesburg College, Pa., Lincoln University, Ill., Trinity University, Tex., Bethel College, Tenn., with a number of minor grade in different States.

A Board of Missions and a Board of Publications were organized by the General Assembly, in 1845. The former is now located in St. Louis, Mo., and the latter in Nashville, Tenn. In addition to its home work, the Board of Missions has 7 missionaries in Japan. A Woman's Board of Foreign Missions was formed in 1880, and a Board of Ministerial Relief was formed in 1881, both located at Evansville, Ind.

Although extending over both free and slave States, this church was not divided by the civil war. It is now in a healthy condition, with an unlimited field before it and more work than it has men and means to perform. (J. R. B.)

CUMMING, JOHN, D.D. (1810–1881), a British divine, born in Aberdeenshire, Scotland, Nov. 10, 1810. He was educated at King's College, Aberdeen, and in 1833 was ordained minister of the Scotch Church, Crown Court, Covent Garden, London. He clung with persistency to the Scottish National Church, and strongly opposed the Free Church movement and the disruption of 1843. He early acquired renown as a brilliant and impassioned pulpit orator, and his intense opposition to Romanism attracted much attention. Not less conspicuous were his championship of the doctrine of the speedy second coming of Christ and his attempts, in sermons, lectures, and books, to explain the prophecies of Scripture. In his later years his popularity waned, and for some years he was unable to preach. He died in London, July 6, 1881. Among his works are *Apocalyptic Sketches* (1849); *God in History and in Science* (1851); *The Great Tribulation* (1859); *The Great Preparation* (1861); *Voices of the Night; The Destiny of Nations* (1864); *The Sounding of the Last Trumpet* (1867); *The Fall of Babylon Foreshadowed* (1870). These and other works of his had an extensive sale on both sides of the Atlantic.

CUMMINS, GEORGE DAVID, D.D. (1822–1876), an American bishop, born near Smyrna, Del., Dec. 11, 1822. He graduated at Dickinson College in 1841; entered the Methodist ministry as a licentiate; took orders in the Episcopal Church in 1846; held rectorships in Baltimore, Norfolk, Richmond, Washington, and Chicago, and in 1866 was consecrated assistant bishop of Kentucky. He was early recognized as a leader of the low-church or evangelical party. In 1873 he withdrew from the Protestant Episcopal Church, not wishing any longer to countenance what he regarded as the errors of the high-church party in matters of faith and practice; and in the same year there was organized under his leadership the denomination known as the Reformed Episcopal Church. Bishop Cummins was an eloquent and conscientious man, and entered upon the work of building up the new denomination with great zeal and energy; but the care and labor of his new position were too great for his strength, and he died at Lutherville, Md., June 26, 1876. (See *Memoir of Bishop Cummins, by his Wife*, 1878.)

CUNNINGHAM, ALEXANDER, an English archæologist, second son of Allan Cunningham, the Scottish poet, was born at Westminster, Jan. 23, 1814, and educated at Christ Hospital and at the Military College, Addiscombe. He was appointed second lieutenant of engineers in 1831; aide-de-camp to the governor-general of India in 1834; was sent on a special mission to Cashmere in 1839; and became engineer to the king of Oudh in 1840. In 1846 he was made head of a mission to Thibet, and chief-engineer of the north-west provinces in 1858. In 1870 he received the office of surveyor-general of Indian archæology, and in 1871 was made a member of the order of the Star of India. He now holds in the army the rank of major-general. He is the author of many articles on archæological

subjects, published in the *Journal of the Bengal Asiatic Society* and other periodicals, and has issued the following works: *An Essay on the Aryan Order of Architecture* (1849); *The Bhilsa Topes, or Buddhist Monuments of Central India* (1854); and *Ladak, Physical, Statistical, and Historical* (1854); with voluminous official reports upon the antiquities of Northern Hindostan, which have been reprinted by the Indian government.

CURCI, CARLO MARIA, an Italian theologian, was born in Naples in 1810. He was educated at the Jesuit College in Rome, and when 15 years old entered the Society of Jesus. He became a popular pulpit orator, and distinguished himself in a controversy with Gioberti, who had attacked the Jesuits. His first publication was *Fatti ed argomenti*, in defence of the Society to which he belonged. After some years' residence in Paris he returned to Naples, where he founded and edited *La Civiltà Cattolica*, in which he advocated concessions by the Catholic Church to the movement for Italian unity. His course was not approved by the Society, and in 1865 he retired from the management of the *Civiltà*, which was then published at Rome. He preached in several Italian cities, and was everywhere received with great attention. His work, *Lezioni esegetiche e morali sopra i quattro Evangeli* (5 vols., Florence, 1874–76), produced a great sensation. In the preface of it he maintained that the temporal power of the pope, though it had subserved a good purpose in former ages, was not essential to the effective working of the church. He therefore urged an acquiescence in the present practical relations of the church to the state. For this he was visited with ecclesiastical censure, his preface was condemned, and he was expelled from the Society of Jesus. He subsequently made a declaration of his opinions which was accepted as a recantation, and he was restored to the society. On the accession of Leo XIII. to the papal chair, Curci was received for a time into the Vatican by his old friend Cardinal Giovanni Pecci, the pope's brother. He now expressed still more plainly his views in his essay, *Il moderno dissidio tra la Chiesa e l'Italia* (1878), in which he supported the opinions of Gioberti, which he had originally opposed. His work was condemned, but he recorded his protest against the prevailing party in another essay, *La nuova Italia e i vecchi zelanti* (1881). He had also in the meantime pursued his scriptural studies, and had completed and published his Italian translation of the New Testament, accompanying it with exegetical and moral notes (Turin, 1879–80). His latest publication is *Il Vaticano Regio* (1884), in which he strenuously assails the autocratic sway of the pope, and urges a return to a simpler and more spiritual method of conducting the work of the church as essential to its success.

CURCULIO, PLUM (*Conotrachelus nenuphar*, Herbst). The "little Turk," or "the Curculio," as it is commonly called, is found all over the Atlantic slope and in the Mississippi valley wherever the plum is cultivated. It is by no means confined to this fruit, however, but matures alike in nectarines, peaches, apricots, cherries, apples, pears, and quinces. It is also found in "black knot" upon the plum. It is single brooded, and hibernates as a beetle under sticks and stones and often just beneath the surface of the ground. In its beetle state the curculio feeds continually during mild weather, gouging holes in the fruit as long as it lasts, and after it has gone feeding upon the leaves, and even upon the bark of the more tender twigs. The time in spring when it begins to puncture fruit for oviposition varies, of course, in different parts of the country, but it may be said in general that it is when the peach has attained the size of a small marble. The method of work is briefly as follows: the female curculio, alighting upon a peach, first cuts a hole through the skin and inserts her beak to the depth of a sixteenth of an inch, working it back and forth until quite a cavity is formed; then, turning around, she drops an egg into this cavity. Reversing her position again she cuts a semi-circular flap in front of and including the egg cavity, and the operation is finished. The flap is cut so that the growing fruit may not crush the egg. The ovipositing continues for from six weeks to two months, and each female lays from 50 to 100 eggs. The egg is oval, pearly white in color, and large enough to be seen with the naked eye. It hatches in from four to six days, and the young maggot eats its way to the stone, boring round it, and finally causing all infested fruit (except cherries) to fall. The length of the larval life is from four to five weeks, and the pupa is formed underground. The pupa state lasts about three weeks.

Remedies.—Among the natural enemies of the curculio it may be mentioned that a number of ground-beetles (*Carabidæ*) and other predaceous insects destroy the *larvæ* and *pupæ*, and that it has two true parasites—*Sigalphus curculionis*, Fitch, and *Thersilochus conotracheli*, Riley. Of artificial remedies the most effectual of the hundreds which have been proposed consists in jarring the tree and catching the curculios in sheets stiffened by wooden arms. This principle is the basis of several curculio-machines such as the "Hull Curculio-Catcher," an instrument shaped like a large inverted umbrella mounted on a barrow-wheel. The "chip-trap process" consists in trapping the curculios under chips placed upon the ground around the butt of the tree in the early part of the season.

CURLEW, a long-billed, long-legged wading bird of the family *Scolopacidæ*, and genus *Numenius*, including about 14 species of all parts of the world. They are characterized by the length, slenderness, and decurvature of the bill, which always exceeds the head in length, is sometimes several times as long, grooved for a great distance, with the upper mandible terminating in a slight knob, which overhangs the tip of the under mandible; the wings long and pointed; the tail short and nearly even; the legs long, naked above the suffrago or heel-joint; the tarsus scutellate in front; the front toes semipalmate with basal webbing, the hind toe short and elevated; the body plump, with rather long neck. Their nearest relatives in the family are the godwits (*Limosa*), like which they are characterized by a general rufous coloration, varied above with blackish. Curlews inhabit dry, open uplands as well as the marshes, sand-bars, and mud-flats of rivers, lakes, and estuaries of the sea, feeding much upon berries and other fruits, as well as any kinds of aquatic animals, as small mollusks, crustaceans, annelids, and numberless insects, especially grasshoppers. They nest upon the ground, laying three to four comparatively large pyriform eggs, of some drab or olivaceous ground color, heavily spotted and splashed with browns, grays, etc. They are gregarious, especially during the migrations, when in the cases of some species flocks of thousands assemble at favorite feeding-grounds and move in con-

See Vol. VI. p. 628 Am. ed. (p. 711 Edin. ed.).

ɔert. Some species also colonize to a certain extent durin; the breeding season. In the northern hemisphere, at least, curlews are migratory, generally breeding in the far north, and performing vast journeys in spring and fall. The voice is loud and resonant, consisting of a monotonous reiteration of strident single syllables. Most species belong to the northern hemisphere. Those in North America are five in number: 1. The largest and longest billed species of the genus is *N. longirostris*, the total length of which is about 24 inches, the wing 11 or 12, the tail about 4, the tarsus 2¾, while the bill ranges from 5 to 8 or even 9 inches. The color is cinnamon-brown of varying shade, brightest under the wings, varied above with black, especially on the back, wings, and top of the head, and the breast and sides with dusky streaks, arrow-heads or cross-bars; the tail barred throughout with black and cinnamon. The long-billed curlew inhabits the United States more particularly, breeding within such limits, and not proceeding to the high north like the others. In most localities it is the usual species. 2. The Hudsonian curlew (*N. hudsonicus*) is smaller than the last; length 16 to 18 inches; wing 9; tail 3½; bill 3 or 4 inches; it is also distinguished by its much paler coloration, and by having the primary wing-quills barred. It breeds far north, passing through the United States in flocks in the spring and fall. 3. The European Whimbrel (*N. phæopus*), resembling the last and of about the same size, occurs as a straggler to Greenland. 4. The Esquimaux curlew (*N. borealis*) is one of the smallest species of the genus, about 14 inches long, the wing under 9, the bill under 3, and extremely slender. The pale tone of plumage is much as in the last, but the primaries are unbarred as in the first. Vast flocks of these birds are found on the coast of Labrador in the late summer months, feeding upon the "curlew berry" (*Empetrum nigrum*), which there covers the ground in profusion. The flocks reach New England and the Middle States late in August and in September, are in good condition, and highly esteemed for food. Both the Esquimaux and the Hudsonian penetrate far into South America in winter. 5. The bristle-bellied curlew (*N. tahitiensis*) is only a straggler to Alaska. All the species resemble one or another of the three leading North American species. The European *N. arquatus* is one of the largest and best known. The name *numenius*, signifying "new moon," has reference to the slenderly crescentic shape of the bill. (E. C.)

CURRANT. The garden-currant being a native of far northern regions was not known to the Greeks, and there is no evidence that the Romans knew anything of it, though, as a native of Britain, it must have been met with in that province. It has been long under culture in Italy, and one of its oldest names, *Uva di Fratri*, indicates an early place in the gardens of the monasteries. There is no trace of any early English name, and its original improvement is probably due to the people of the low countries. Dodonæus, in his *Stirpium Historiæ Pemptades* (Antwerp, 1583), speaks of it as being then common in gardens, and figures both the black and red currants. He says it had been known as *Grossularia transmarinum*, indicating that even there it had been introduced, though he says at that time it had come to be known as *Ribes*. Ray, writing in 1688, shows that the plant cannot be identical with the *ribes* of Serapion, and modern investigators have identified that plant with a species of rhubarb. The common name *currant* is derived from its resemblance to the "grape of Corinth," or currant of commerce. Ray says in his time they were known as "squinancy-berries:" this name comes from a popular belief that the currant was a good remedy for the "squinancy," or quinsy. An early German name was *Sankt-Johannisbeere*. That the improved currants came to Britain from the continent is clear from the name of the earliest-known and still most popular variety—*Red Dutch*.

See Vol VI. p. 631 Am. ed. (p. 715 Edin. ed.).

In America the red currant, *Ribes rubrum*, is found wild in the north across the continent, and the imported varieties are favorite fruits in northern gardens. Whenever the summer temperature is not often above 85° it thrives very well, and especially if the atmosphere be humid. In Canada and British Columbia the plants grow with especial vigor, often attaining a height of four or five feet. In parts of California, where the water is not far from the surface, and the location not distant from the moist atmospheric currents from the Pacific, their growth is remarkable, and they form one of the most profitable of fruit crops. There are many hundreds of acres planted with currants within a few days' ride from San Francisco. In the Eastern or Atlantic States they are also grown largely near all the large cities, seldom bringing less than $2 per bushel. Ten cents per pound is regarded as an average price, and at this figure the net product is about $600 per acre, calculating 2½ pounds to a plant. The best cultivators renew the plants every five years, though with care they last much longer. The fruit is among the most popular for jelly, and a large portion of the crop is now used in this way. The juice is condensed by the same process used with milk; and, as with jelly, has become a prominent article of commerce. Two European insects have followed the plant to the new world, and are very destructive. One is the *Nematus ventricosus*, the caterpillars of which will soon strip a plant of its leaves; and *Ægeria tipuliformis*, called also *Trochilium tipuliforme* by some authors, which bores into the stems, weakening and finally destroying them.

There are a number of American species of currant introduced into gardens for ornament, some of which have fruit palatable to the Indians, and may be the parents of improved races. *Ribes aureum*, known to cultivators as the "Missouri currant," and highly prized for its early and odoriferous flowers, produces varieties which in the dryer portions of the continent have very large and palatable fruit. In Utah they are grown in gardens, and have fruit sometimes three inches in circumference. They are known to fruit-growers as "Utah currants," and are of many shades of color from black to amber. In moister regions the plants grow with enormous vigor, and the fruit is smaller and less agreeable to the palate. In the Rocky Mountains, and farther west, *Ribes cereum* is the prevailing species, affording grateful food to numerous living things. This is probably the species referred to in the *Report of the United States Department of Agriculture* for 1870 as being called *Samita* by the Indians of New Mexico, although the additional statement that "in Colorado several settlers came near losing their lives by eating this berry" is probably apocryphal. No species of the genus is likely to be poisonous. In Alaska the Indians call the fruit of *Ribes bracteosum* "*Schaum*," and dry the ber in fat. and press the mixture into cakes. Pieces off and whipped in liquid,

steam, when required for use. This species belongs to the black currant section. The plant is sometimes six feet high, has leaves as large as an average grape, and the racemes of fruit are often nearly a foot long. Another species resembling this, the fruit of which is also used by the Indians of British Columbia and Alaska, is *Ribes Hudsonianum*, but is not estimated quite so highly. It is dwarfer, and usually grows on rotten trunks or around the stumps of dead trees. *Ribes prostratum* is also of the black currant section. The odor of the leaves is stronger than that of any other species, and so disagreeable to many as to have obtained the common name of "fetid currant." *Ribes floridum* is the black currant of the Eastern States, and highly appreciated in ornamental gardening for the delightful color of its autumn leaves. *Ribes speciosum* and others from the Pacific have beautiful flowers, but have not submitted gracefully to culture in American gardens.

The currant of commerce has, in common with other varieties of the *Vitis vinifera*, been introduced into cultivation in California; but its dried fruit has not as yet been found so profitable an article of production in California as has the ordinary raisin. (T. M.)

CURRENCY. See MONEY.

CURRENTS, OCEAN. The material of the earth's surface exists in three separate states, known, respectively, as solid, liquid, and gas; the first motionless, the two others in continuous motion. These motions have for their primary cause the differential action of the sun's heat upon the earth's surface, while their direction in any locality is largely influenced by the rotating motion of the earth. The land surface also, while motionless in itself, exerts a powerful influence upon the motions of air and ocean, and greatly affects the direction of these motions. Finally, the currents of the air impinge vigorously upon the waters of the ocean, and give rise to those great oceanic rivers with which we have here mainly to deal.

The atmospheric and oceanic motions caused directly by the action of solar heat may be briefly described as preliminary to the consideration of the currents of the ocean. In both air and ocean there is produced a vertical circulation. The air expands and rises in the tropics, flows towards the poles in the upper atmosphere, descends to the surface in the temperate zones, and thence partly returns to the equator, partly continues to flow towards the poles. These air currents, deflected by the rotating movement of the earth, become the easterly trade-winds in the tropics, and the westerly anti-trades in the north and south temperate zones. They are greatly disturbed, particularly in the northern hemisphere, by the influence of the land surface, which acts to produce monsoons, or steady winds to and from the centres of the continents. In the southern hemisphere they are more persistent, and particularly in the south temperate zone, whose broad expanse of ocean permits the westerly winds to blow steadily and strongly throughout the year.

A similar vertical circulation exists in the oceans, from the same cause. The heated waters of the tropics expand and rise. The chilled waters of the polar zones contract and sink. Thus the surface level is disturbed, and there is a steady set of the equatorial waters north and south to reproduce a surface equilibrium. But, in consequence of this movement, the northward pressure of the ocean waters in the polar regions becomes in excess of that at the equator, and a reverse flow takes place along the bottom to restore equilibrium of pressure. Thus, through the differential action of the solar heat, there is a steady vertical circulation both in the atmosphere and the ocean. That of the latter is not sufficiently vigorous to indicate itself by a decided surface flow, but its presence has been recently proved by deep-sea thermometrical observations widely extended over the oceans. To it is undoubtedly due much of that special warming of the western coasts of the continents, which was formerly ascribed solely to the influence of the Gulf Stream and the other great surface currents.

The surface currents, or, as they have been called, "the rivers of the ocean," next claim our consideration. There are five of these great currents which flow in vast curves between the equatorial and the temperate zones, with several others, whose cause and character are less evident, which flow from the frigid zones. In regard to the equatorial currents several theories as to their cause have been promulgated, but meteorologists have finally settled on one of these as the only satisfactory explanation. It is decided that they are due to the trade-winds, whose steady push upon the tropical waters keeps them in continuous motion westwardly around the earth.

But these oceanic currents, thus primarily due to the currents of the atmosphere, are remarkably influenced in their direction and consequences by the land surface of the earth. If the ocean were continuous in the tropical zone the currents produced by the trade-winds would flow around the earth in this zone, without deflection north or south. But the continents stand in the way. The westward setting tropical waters of the Atlantic, for instance, are checked in their course by the South American coast, and turned north and south towards the temperate zones, into which they flow as great currents of warm water, to mitigate the climates, and exert an important influence upon the rainfall of these regions. In the Pacific the same result occurs. The western flowing waters impinge upon the coast of Asia and the Indian archipelago, and are deflected in great curves to the north and south. A similar effect is produced in the Indian Ocean. But the northern section of this ocean is so land-locked, and the winds so irregular, as to prevent the formation of a fixed current, and the only decided flow here is to the south, along the east African coast. The currents here briefly indicated are known respectively as the Gulf Stream and the Brazilian Current, of the Atlantic; the Kuro-Siwo, or "Black Stream," of the North Pacific; the East Australian Current, of the South Pacific; and the Mozambique Current, of the Indian Ocean.

The land surface exerts another important influence upon these currents, which is due to the peculiarities of distribution of land and water. The southern hemisphere contains the great mass of the water, the northern the great mass of the land surface of the earth, there being thirteen times as much land north as south of the equator. There results an important influence upon the heat distribution, in consequence of which the trade winds are greatly deflected to the north. In the Atlantic, in March, the zone of calms between the trades extends from the equator to 3° N. latitude. In September it extends from 3° N. to 11° N. latitude, the southern trade crossing the equator. In the Pacific the zone of the trades is still farther north. Important consequences arise from this, particularly in the Atlantic. In consequence of the separation of the northern and southern trades by the zone of calms, which varies from 3 to 8 degrees in width,

there are two westerly currents from the African coast across the Atlantic. On reaching the South American coast these are partly deflected back into the zone of calms, where they form an easterly equatorial current, and partly deflected north and south. The current of the northern trade flows northward along and through the archipelago of the West Indies. That of the southern trade strikes on the protruding South American coast, and is divided by Cape St. Roque, part of it flowing south as the Brazilian current, part north along the westward sloping coast into the Caribbean sea, where, in combination with some portion of the northern current, it circulates around the Gulf of Mexico, and finally rushes through the narrow channel between Cuba and Florida, as a mighty stream of hot water, which, according to Colding, passes the Straits of Bemina with a width of 30 miles, and a discharge volume of about 40 cubic miles per hour. Its width is variously estimated by the several authorities at from 30 to 60 miles, its depth from 600 to 2200 feet, and its speed from 3 to to 5 miles per hour; these estimates being probably made at different points, and by different methods.

Flowing north along the American coast it steadily widens and shallows, while its heat is gradually lost to the air. At Newfoundland it is 320 miles wide, and has lost two-thirds of its speed; while its depth has been greatly reduced, and it has lost much of its high temperature. From this point its easterly deflection, under the influence of the earth's rotation, becomes decided, and it flows towards the European coast, steadily widening, shallowing, and cooling. At 47° N. latitude, and 25° W. longitude, it has become a vast sheet of warm water, 800 miles wide. At this point it divides into two branches. One of these continues to flow to the north-east, along the coasts of Ireland, Scotland, and Norway, and probably extends beyond Spitzbergen, where its influence is entirely lost. The other moves to the south-east, flows along the coasts of Spain and Africa, and eventually rejoins the north equatorial current, thus completing a great oval whirl through the North Atlantic. In the centre of this whirl is a vast extent of comparatively calm water, known as the Sargasso sea, from the great quantities of *sargassum*, or floating sea-weed, which covers many square leagues of its surface, and affords a home for innumerable forms of life. It has been estimated that the Gulf stream conveys into the North Atlantic one-twelfth of the whole amount of solar heat received by the torrid zone. It thus must greatly mitigate the chill of the northern zones.

In the region of Newfoundland the Gulf stream meets an Arctic current of cold water, which flows from Baffin's Bay and along the east coast of Greenland, southward along the American continent, upon whose shores it is thrown by the action of the earth's rotation. The influence of this cold stream is felt as far south as Cape Cod, and it probably extends much farther south, between the Gulf stream and the coast. It probably partly underflows the Gulf stream, and forms the cold bottom of this warm ocean river. It also seems to interlace with it, as strands of cold and warm water can be traced. Finally a great portion of the polar current seems to be deflected and to unite with the Gulf stream at Newfoundland, since the volume of the latter is estimated to be doubled from this point eastward. Its total volume is estimated by Haughton as four-fifths of that of the Gulf stream.

The Brazilian current is much smaller in volume, and of much less importance than that of the North Atlantic. It flows southward along the South American coast to the mouth of the La Plata, about 35° S. Here it is met and deflected by a cold current from the south, which comes up past Cape Horn. The united streams move easterly with great variations of temperature at their points of junction, and in consequence deep fogs and severe gales. The eastward flow continues to the Cape of Good Hope, where some of the water turns up the African coast towards the equator to complete the South Atlantic whirl, while the remainder flows on easterly beyond the cape as part of the great polar flow, which makes the circuit of the earth in the ocean to the south of the continents.

This south polar current is more decided than that of the north polar region. The latter is land-locked, and the movements of its winds and waters greatly hindered. But south of the continents a zone of continuous ocean encircles the globe, over whose surface the anti-trade winds blow in a steady and strong current. It is probably to this that we must impute the continuous easterly polar current of the southern zone, which has an important effect in chilling the southern seas, and has been known to bring up icebergs into the South Atlantic as far as the latitude of the Cape of Good Hope. It chills the southern branches of the equatorial currents, and appears on the western coasts of America, Africa, and Australia as cold northerly currents, of which the best known is the Peruvian or Humboldt's current, on the South American coast. Its influence on the coast of Africa is to sometimes depress the ocean temperature near Cape Town 20° lower than in the same latitude on the eastern side of the continent.

The Pacific currents are not nearly so well known as those of the Atlantic. The North Pacific drift current is deflected northward by the islands north of New Guinea, and becomes a strong north-east stream of warm water, estimated by Dr. Haughton to be nearly three times the volume of the Gulf stream, though of less velocity, since its waters are never, like those of the latter, confined within a narrow channel. This flows past the Japanese islands, where it is known as the Kuro-Siwo, or "Black Stream." Thence its waters move eastwardly to the American coast, and southwardly along this coast, whose temperature it greatly mitigates, so that the shores of Southern Alaska and British Columbia are free from the ice that besets the Asiatic coasts of the same latitudes. The narrowness and shallowness of Behring Straits hinders any strong deflection of the waters of this current northward into the polar seas, and the Arctic current which flows through this channel is much less important than that which flows into the Atlantic; yet its influence is strongly indicated during the summer melting of the polar ice by the decided southward curving of the isothermal lines. No Sargasso sea has yet been found in the North Pacific, though it may exist in some part of this vast and little traversed space.

In the South Pacific there is no such strongly marked current as in the north. The equatorial stream is partly turned back by some of the numerous islands of these seas, but mainly makes its way to the East Australian coast, where it meets the Antarctic current from Bass's Straits. The combined currents flow easterly, and sometimes attain the great velocity of 100 miles a day, between Australia and the northern island of New Zealand. There is a strong easterly current also to the south of New Zealand. Eastward still the

course of the combined polar and equatorial currents is not well known, until they reach the South American coast, where they become marked as the cold Humboldt's current, which brings fogs and chill airs to the shores of Chili and Peru.

In the northern portion of the Indian Ocean the varying monsoons cause variations in the currents. During the winter, the season of the north-east monsoon, the waters flow westward around the coasts of the Arabian Gulf. But they pursue the opposite direction during the summer half the year, the season of the south-west monsoon. In the Southern Indian Ocean the trade winds set up a strong westerly current, which is turned to the south by the African coast, and by that of the Island of Madagascar. It is here divided into two branches, one of which moves along the eastern shores of Madagascar, and flows south till it meets the Antarctic drift current. Thence it runs to the east, a small portion of it flowing up the West Australian coast, but the great body of the stream passing south of Australia, and joining the South Pacific flow. The other branch of the Indian Ocean current flows through the Mozambique channel, and continues southward until it reaches the Agulhas bank, which extends to the southward of Africa. Here it receives its most usual name, that of the Agulhas current. This stream is the most important of the three southern systems, and in the neighborhood of Cape Corrientes has been observed to have a velocity of nearly 6 miles per hour, and a volume exceeding that of the Gulf stream. It is a warm water stream, and at its region of junction with the cold Antarctic current changes of temperature of 20° in a day occur, with the necessary consequence of violent storms and heavy seas. Dr. Haughton estimates the total volume of the five equatorial currents at 6½ times that of the Gulf stream, and that they carry away more than half the total solar heat of the tropics, to redistribute it in the temperate zones. An opposite effect is produced by the Polar currents, which bring much of the polar chill to the temperate zones, so that the eventual effect of these streams is to render the earth more habitable by their vigorous influence in the equalization of terrestrial temperatures.

In addition to the currents named there is a counter drift current between the trades in the Pacific, like that spoken of as occurring in the Atlantic, flowing eastward through the equatorial zone of calms. These currents of warm water are marked by their intensely blue color, which in the Gulf stream and the Kuro-Siwo sharply distinguish them from the bounding sea. The Gulf stream, indeed, is as clearly marked in color and temperature from its bounding water-wall as is a river from its banks. They are also noted for their intense saltness, as compared with the neighboring waters. This results from the tropical evaporation and the consequent concentration of salt in the remaining water. Maury describes the Gulf stream as having a convex surface, from the expansive action of its heat, so that its water tends to clean itself of drift material, by a constant flow off to the right and left into the lower level of the bounding waters. (C. M.)

CURRY, DANIEL, an American Methodist minister and editor, was born near Peekskill on the Hudson, N.Y., Nov. 26, 1809. He attended the public school of the neighborhood, and worked on his father's farm. In 1833, having determined to enter the ministry, he commenced a course of academical training, and graduated from Wesleyan University, Middletown, Conn., in 1837. The next two years were devoted to teaching, and in 1839 he removed to Georgia, where he entered the itinerant ministry of the Methodist Episcopal Church, and was stationed successively at Athens, Savannah, and Columbus in that State. In 1844, on account of the threatened disruption of the Methodist Church, he returned to New York, and was appointed to churches in New York and Brooklyn, New Haven, and Hartford. In 1854 he was elected president of Asbury University at Greencastle, Ind., which office he filled for three years, and then, returning to New York, resumed the pastorate at Middletown, Conn., and in New York and vicinity. At the General Conference of 1864, in Philadelphia, he was chosen editor of the *Christian Advocate* of New York, the principal newspaper organ of his denomination, and by successive re-elections held that place till 1876, when he was transferred to the editorship of the *National Repository*, the monthly Church magazine, which place he held till 1881. He was afterwards engaged as associate editor of the *Methodist*, a non-official religious weekly in New York. After his return from the South he took an active part in the anti-slavery movements of the times, which he aided with his voice and pen. He has been eight times chosen as delegate to the quadrennial General Conference of his Church. In 1852 he received the degree of D. D. from his alma mater, and in 1879 that of LL.D. from Syracuse University. In 1884 he was appointed editor of the *Methodist Quarterly Review*. Two volumes of his contributions to periodical literature have been published. He died in New York, Aug. 17, 1887.

CURTESY, the life-estate to which a man was at common law entitled in the lands and tenements of his wife. Curtesy is either initiate or consummate—initiate prior to the death of the wife, consummate after her death.

At common law there were four essential requisites of curtesy consummate: (1) there must have been a binding and valid marriage; (2) the wife must have had actual seisin during the coverture of the lands wherein curtesy is claimed; (3) there must have been issue of the marriage born alive who might by possibility have inherited the estate; (4) there must have been an actual death of the wife. The strictness of the common-law rule requiring actual seisin on the part of the wife is now disregarded in the United States, a right of entry of constructive seisin being held sufficient in cases where there is no actual adverse possession. In some States the necessity of issue being born has also been abrogated by statute.

The occurrence of a tenancy by the curtesy is in modern days not very common either in England or the United States—in England, on account of the almost universal prevalence of family settlements; in the United States, on account of the passage of statutes defining the husband's rights in his wife's estate. (L. L., JR.)

CURTILAGE, in law, the enclosed space immediately surrounding a dwelling-house and contained within the same enclosure. This enclosure may consist either of a separate fence or partly of a fence and partly of the exterior buildings within the enclosure. The word "curtilage" has come down to us from feudal times. It originally signified the land with the feudal castle and outhouses, enclosed often within high stone walls.

The breaking and entering by night of any part of the curtilage, with intent to commit felony, constitutes burglary. In Michigan a somewhat broader signification seems to be attached to the term "curtilage" than is elsewhere accorded to it. (L. L., JR.)

CURTIN, ANDREW GREGG, an American statesman, was born at Bellefonte, Pa., April 22, 1817. His father was a native of Ireland, but emigrated to Pennsylvania in 1793, and engaged in the manufacture of iron. Andrew, after receiving an academic training, studied law in Dickinson College, and was admitted to the bar at Bellefonte, in 1837. He was soon actively engaged in political, as well as professional, labors, and was an effective speaker in behalf of the Whig party. In 1848 he was one of the presidential electors for his State, and in 1854 he was appointed by Gov. James Pollock secretary of the commonwealth, having also the superintendence of the common schools. In 1860 he was the candidate of the Republican party for governor, and after an exciting campaign was elected. The outbreak of the Civil War immensely increased the responsibilities of this office, but Gov. Curtin discharged them well. In April, 1861, Pres. Lincoln called upon the States for 75,000 men for a three months' campaign; the little quota of Pennsylvania was soon filled, while thousands of volunteers sought the opportunity to testify their devotion to the Union. As the authorities at Washington refused to receive these, Gov. Curtin recommended to the legislature the formation of a corps of 13 regiments of infantry, with 1 of cavalry and 1 of artillery, to be in readiness for any emergency.

When the defeat of Bull Run, in July, compelled the National Government to summon more troops, this Pennsylvania Reserve Corps entered upon its memorable career. Throughout the war Gov. Curtin diligently promoted the Union cause, and was frequently called "the soldiers' friend." In 1863 he inaugurated a movement to establish schools for soldiers' orphans, and this was afterwards effectually carried out under the superintendency of Thomas H. Burrowes. In 1867 Gov. Curtin retired from office, at the close of his second term, but later he was appointed by Pres. Grant Minister to Russia. On his return to America, in 1872, he gave his adhesion to the "Liberal Republican" movement, and afterwards passed into the Democratic party. Being nominated by that party for Congress, in 1878, he contested his district, but was defeated by a small majority. In 1880, however, he was elected, and several times re-elected, serving in his second term as Chairman of the Committee on Foreign Affairs.

CURTIS, BENJAMIN ROBBINS (1809–1874), an American jurist, was born at Watertown, Mass., Nov. 4, 1809. He graduated at Harvard in 1829, and, having entered on the study of law, was admitted to the bar in 1832. He practised his profession first at Northfield, but soon removed to Boston, where his practice became large and lucrative. He was noted for his clear statements and extensive learning. He served two years in the Massachusetts legislature, and in 1851 he was appointed by Pres. Fillmore an associate justice of the United States Supreme Court. In 1857 he resigned his seat on the bench, and resumed his practice as a lawyer in Boston. In March, 1868, he was one of the counsel for Pres. Johnson before the court of impeachment, and his argument was highly approved for its correct application of the law. He died at Newport, R. I., Sept. 15, 1874. He published *Reports of Cases in the Circuit Courts of the United States* (2 vols., 1854); *Decisions of the Supreme Court of the United States* (22 vols.); and a *Digest* of the same to 1854.

CURTIS, GEORGE TICKNOR, an American lawyer and author, brother of the preceding, was born at Watertown, Mass., Nov. 28, 1812. After graduating at Harvard College, in 1832, he studied law, and was admitted to the bar in 1836. He was a member of the Massachusetts legislature from 1840 to 1844, and was appointed United States Commissioner for Massachusetts. While he held this position the Fugitive Slave Law of 1851 was passed, and he was soon called upon to execute it by remanding to his master a fugitive from Virginia named Thomas Sims. In spite of the popular odium thus incurred he carried out the law. In 1862 he removed to New York, where his professional ability has secured for him an extensive practice. Throughout his career he has been a diligent author, and his works on various departments of law have secured the highest approval. Among them are *Rights and Duties of Merchant Seamen* (1844); *Law of Copyright* (1847); *Law of Patents* (1849; 4th ed., 1873); *American Conveyancer* (2d ed., 1871)); *Equity Precedents* (4th ed., 1869); *Digest of Decisions of Courts of Common Law and Admiralty*. He also published *Commentaries on the Jurisprudence, Practice, and Peculiar Jurisdiction of the Courts of the United States* (2 vols., 1854–58). Besides these strictly professional works he has published a valuable *History of the Constitution of the United States* (2 vols., 1855–58), *Life of Daniel Webster* (2 vols., 1870), *Creation or Evolution* (1887), etc.

CURTIS, GEORGE WILLIAM, LL.D., an American author and editor, was born in Providence, R. I., Feb. 24, 1824. He removed with his father to New York in 1839, and in 1842 joined the Brook Farm Association at West Roxbury, Mass. In 1846 he went to Europe, and passed four years in travel and study, being a student in the University of Berlin during the Revolution of 1848. Returning home in 1850, he published *Nile Notes of a Howadji*, which was soon followed by the *Howadji in Syria*. He was for some time connected with the *New York Tribune* as an editorial writer and art-critic, and for many years he was a lyceum lecturer. Mr. Curtis was one of the original editors of *Putnam's Monthly*, which was begun in 1853, and he was involved in the failure of the publishers of that magazine in 1857. Since that time he has had an unbroken literary connection with the publishers of his books, Messrs. Harper & Brothers. Since 1858 he has written the "Easy Chair" for *Harper's Magazine*, and since 1863 he has been the political editor of *Harper's Weekly*. In 1863, Pres. Lincoln offered him the post of consul-general in Egypt. In 1867 he was a delegate at large in the constitutional convention of New York. He was elected one of the regents of the University of New York in 1864, and was nominated as secretary of state of New York in 1870, but declined. In 1871 he was appointed by Pres. Grant upon the commission of inquiry into the civil service, and was made chairman of the commission. In 1877, Pres. Hayes offered him the mission to England, and in 1878 that to Germany, both of which he declined. His works are—*Nile Notes of a Howadji* (1850); *The Howadji in Syria* (1851); *Lotus-Eating* (1852); *Potiphar Papers* (1852); *Prue and I* (1853); *Trumps* (1856). Mr. Curtis has received the degree of A. M. from Brown University, and that of LL.D. from Harvard, Madison, and Brown universities. He has been for years a prominent advocate of civil-service reform in the United States. His editorials are clear, crisp, and brilliant, and he is especially distinguished as a writer on the usages of society, manners, and minor morals. In politics he has been a rad-

ical Republican, and labored to maintain a healthy moral tone in his party. Although a delegate to the Republican National Convention in 1884, he afterwards refused to support the party nominees.

CURTIUS, Ernst, a German historian and Hellenist, was born at Lübeck, Sept. 2, 1814. He studied in the College of Lübeck, and afterwards at the Universities of Bonn, Göttingen, and Berlin. In 1837 he proceeded to Athens to prosecute his researches into Hellenic antiquities. He afterwards accompanied the celebrated Ottfried Müller on his expedition of archæological research into the Peloponnesus, and on the death of the latter, at Athens, in August, 1840, Curtius returned to Germany. In 1841 he graduated as doctor from the University of Halle, and taught for some years in the colleges of Berlin, where he became Professor Extraordinary in 1844, and was appointed tutor to Prince Frederick William, son of the present Emperor of Germany, which post he retained until 1850. In 1856 he succeeded Hermann as professor of archæology and classical philology at Göttingen, and in 1868 became professor in Berlin. Since that date he has resided in the latter city, where he has been elected a member of the Academy of Sciences. In 1875 he was sent to Greece by the German government, where he concluded the convention which secured to Germany the sole right to make archæological excavations at Olympia. These have been conducted under his supervision.

The works of Prof. Curtius all relate to Greek antiquity. The most important of these are *The Peloponnesus*, which includes a description of Greece, its myths, its history, and its monuments; *De Portubus Athenarum* (Halle, 1842); *Anecdota Delphica* (Berlin, 1843); *Inscriptiones Atticæ Duodecim* (1843); *Zur Geschichte des Weglaus bei den Griechen* (1855); *Die Ionier vor der Ionischen Wanderung* (1855); *Ephesos* (1874); *Alterthum und Gegenwartgesamm* (1875); *Die Ausgrabungen zu Olympia* (1876–7), in conjunction with others; *The Acropolis of Athens; The Topography of Asia Minor; The Inscriptions on Grecian Springs and Fountains;* and a *History of Greece* (1857–66), his best known work in this country.

CURTIUS, Georg, a German philologist, was born at Lübeck, April 16, 1820. Having studied philology at Berlin and Bonn Universities, he obtained the doctor's degree in 1842, and began to teach in Dresden. In 1845 he returned to Berlin, but in 1849 he was called to Prague as professor extraordinary, and two years later was advanced to a full professorship. In 1854 he removed to Kiel to take a similar position, and in 1862 he was made professor of classical philology in the University of Leipsic, which position he still holds. Prof. Curtius has strenuously endeavored to preserve the union between the old philology, founded on the classics, and the more recent, founded on comparative linguistics. In his publications he has explained and illustrated the Greek and Latin languages with the aid of comparative grammar. Among his works are *Sprachvergleichenden Beiträge zur Griechischen und Latinischen Grammatik* (1846); *Grundzüge der Griechischen Etymologie* (5th ed. 1879); and *Das Verbum der Griechischen Sprache* (2d ed. 1877–80); *Zur Kritik der neuesten Sprachforschung* (1885); and *School Grammar of the Greek Language* (1852). He died August 12, 1885.

CURWEN, John (1816–1880), an English teacher of chorus singing, was born at Heckmondwike, Yorkshire, Nov. 14, 1816. He belonged to an old Cumberland family, and was son of Rev. Spedding Curwen. After a course of study at Coward College and in London he began to consider seriously the art of teaching. While assistant-minister at the Independent Church of Basing Stoke, Hants, and afterwards, when co-pastor at Stowmarket, in Suffolk, he studied many educational methods.

On becoming acquainted with the method of teaching singing, as practised by the two Misses Glover, of Norwich, he became convinced of its superiority, and immediately tested it. Being elected pastor at Plaistow, Essex, in 1844, he was able to realize the advantages of the system by teaching it to large classes. When, in 1867, he resigned this position from ill health, Curwen became a printer and publisher in order to produce books for the benefit of students of the Glover method, which was called "The Tonic Sol Fa" system, being then most thoroughly convinced that it was the best-known system for instructing the masses of the people in choral and church music.

He delivered courses of lectures at the Andersonian University, Glasgow, reprinted very many musical compositions in the peculiar notation employed in the "Tonic Sol Fa" method, and published original works also in these characters; he put forth treatises on *Musical Statics, Harmony and Musical Composition*, in which were elaborated and developed the ideas of the "Tonic Sol Fa" system, and issued a bi-monthly paper, *The Tonic Sol Fa Reporter*, which was the chief organ of the movement. In 1853 he formed a "Tonic Sol Fa" association, and subsequently instituted examinations in music to honor successful students. He died May 26, 1880, at Heaton Mersey, near Manchester.

The chief distinguishing peculiarity of Curwen's system of teaching consists in imparting to the pupil, at the very first lesson, some knowledge of the signification of artistic materials. Instead, therefore, of the dry and mechanical method, by which the students were taught to measure intervals by counting so many notes in order to gain a sort of mathematical safeguard or guide, an artistic initiation took place. The pupils were fascinated with the poetic nature of the study, and learned to identify the various notes by the knowledge and remembrance of their inner signification, and not by actual measurements, but by intelligent perception. (S. A. P.)

CUSHING, Caleb, LL.D. (1800–1879), an American jurist and statesman, was born at Salisbury, Mass., Jan. 17, 1800. He graduated at Harvard College in 1817, and began the study of law. Being made tutor of mathematics and natural philosophy in his college in 1819, he held the position for two years. He was admitted to the bar in 1822, and commenced practice in Newburyport. Several popular addresses had already given him local fame as an orator, and he soon became eminent in his profession. In 1824 he married the daughter of Hon. John Wilde of Boston. His political career began when, in 1825, he was elected to the Massachusetts legislature. In the following year he entered the State senate, but was afterwards defeated when a candidate for Congress. In 1829 he went to Europe, where he spent two years in travel. On his return he published *Reminiscences of Spain: the Country, its People, History, and Monuments* (1833). This work showed an extensive acquaintance with Spanish literature, and he ever after retained a warm regard for that nation. In the same year appeared his *Historical and Political Review of the Late Revolution in*

France. His wife also published two volumes of *Letters descriptive of Public Monuments, Scenery, and Manners in France and Spain* (1832). After serving in the Massachusetts legislature for two years more, Mr. Cushing was elected to Congress in 1835, and re-elected till 1843. In this period he also made frequent contributions to the *North American Review* on historical, legal, and social subjects. His public addresses were admired for their purity of style and beauty of sentiment, and his speeches in Congress were vigorous and effective. In politics he belonged originally to the Jeffersonian Republican party, but had now become a Whig, supporting John Quincy Adams for the Presidency, and afterwards writing a campaign biography of Gen. W. H. Harrison in 1840. He was one of the few Northern Whigs who on Tyler's accession to the Presidency followed him in his separation from that party. Cushing was thrice nominated by Tyler as Secretary of the Treasury, but was rejected by the Senate. In July, 1843, he was sent to China as United States commissioner, and though the frigate in which he sailed was burnt off Gibraltar, the official papers were saved. Without waiting for instructions, he proceeded to his destination by way of Egypt and India. He was the first representative of Western civilization that negotiated with the emperor of China on equal terms. The treaty between the United States and that country was signed July 3, 1844, and finally ratified Dec. 31, 1845. Mr. Cushing returned to Washington by way of Mexico, having journeyed round the world in less than a year. This country was just about to plunge into war with Mexico, and in 1846 he was elected to the Massachusetts legislature, where he was a prominent advocate of the war in the face of a stormy opposition from the people of that State. When the legislature refused to appropriate funds to equip a regiment of volunteers, he advanced the requisite amount himself. He was then appointed colonel of the regiment, and went with it to Mexico in the spring of 1847, joining the army of Gen. Taylor. He was appointed brigadier-general April 14, 1847, and took part in the battle of Buena Vista. He was afterwards transferred to the army of Gen. Scott, and served till the close of the war. While in Mexico he had been nominated by the Democrats as governor of Massachusetts, but was defeated. In 1850 he was elected for the sixth time to the State legislature, and opposed the coalition by which Charles Sumner was made United States Senator. Newburyport having been incorporated as a city in 1850, Mr. Cushing was elected its first mayor, and re-elected in the year following. In 1852 he was appointed by Gov. Boutwell an associate justice of the supreme court of Massachusetts, and in the same year received the degree of LL.D. from Harvard College. He was at this time member of the board of overseers of the college and of the American Academy of Arts and Sciences. In 1853, Pres. Pierce appointed him Attorney-General of the United States. At the close of Pierce's administration he again became a member of the Massachusetts legislature, and served till 1860. In April of that year he was president of the Democratic national convention at Charleston, S. C. The extreme Southern delegates refused to be bound by the platform adopted by the majority of the convention. Mr. Cushing went with them, and was afterwards president of the convention at Baltimore by which John C. Breckinridge was nominated for President. Upon the election of Abraham Lincoln the Southern States seceded, South Carolina leading the way. In Dec., 1860, after Major Anderson removed the United States troops at Charleston from the defenceless Fort Moultrie to the strong though unfinished Fort Sumter, the rage of the Secessionists knew no bounds. Mr. Cushing was sent as a confidential agent of Pres. Buchanan to Charleston to induce them at least to defer the attack on Fort Sumter till after the close of Buchanan's administration. But the embassy was useless, and Mr. Cushing, after a brief visit, so reported. In April, 1861, he offered his services to Gov. Andrew of Massachusetts, but received no response. Until the close of the Civil War he confined his attention to his professional duties, being often employed by the departments at Washington, and in July, 1866, he was appointed with two other jurists to revise and codify the laws of the United States. This work occupied years, and during the prosecution of it he was also frequently consulted by the Government on international questions. He assisted in the negotiations for the annexation of San Domingo under Pres. Grant's administration, but the scheme was rejected by the Senate. In 1868 he was sent to the United States of Colombia on a special diplomatic errand. In 1870 he was largely concerned in preparing the protocol of the Treaty of Washington, and afterwards in the statement of the case of the United States to be laid before the tribunal of arbitration at Geneva. He was also one of the counsel before the tribunal, and afterwards published an interesting sketch of its proceedings in *The Treaty of Washington* (1873). On the death of Chief-Justice Chase, in 1873, Pres. Grant nominated Mr. Cushing to fill the vacancy, but on account of the reluctance of the Senate to confirm him the nomination was afterwards withdrawn. He was, however, nominated and confirmed as minister to Spain in December of that year, and was successful in allaying the troubles that had arisen from the Cuban insurrection. He returned to the United States in April, 1877, and died at Newburyport, Jan. 2, 1879. Always ambitious and universally acknowledged to be a man of great ability, he was, however, unable to inspire thorough confidence in the parties with which he acted, and hence was generally regarded as too much a seeker of public position.

CUSHING, Luther Stearns (1803–1856), a Massachusetts lawyer, was born at Lunenburg, Mass., June 22, 1803. He was appointed clerk of the Massachusetts Assembly in 1832, judge of the court of common pleas in 1844, and in 1848 reporter of the supreme court of the State. He published eight volumes of reports. His *Rules of Proceedings and Debates in Deliberative Assemblies*, well known as *Cushing's Manual*, is the standard text-book on the subject. He published also an *Introduction to the Study of Roman Law*, 1854, and *The Law and Practice of Legislative Assemblies in the United States*, 1855. He was also editor for some years of *The Jurist and Law Magazine*. He died at Boston, June 22, 1856.

CUSHING, Thomas, LL.D. (1725–1788), a Massachusetts statesman, was born at Boston, Mass., March 24, 1725. His father, of the same name, was a prominent citizen. The son graduated at Harvard College in 1744, and was elected in 1762 a member of the general court, and in 1763 became Speaker. His name being attached to the public documents, he was regarded in England as the instigator of rebellion, and Dr. Johnson in his *Taxation no Tyranny* observed, "One object of the Americans is said to be to adorn the brows of Mr. Cushing with a diadem." In 1774 he became a member of the provincial congress, and

afterwards of the Continental Congress. He was made commissary-general of Massachusetts in 1775, became judge of probate in 1777, and two years later lieutenant-governor of the State, in which office he remained till his death, Feb. 28, 1788.

CUSHING, WILLIAM B. (1842–1874), an American naval officer, was born in Wisconsin, Nov. 24, 1842. Having studied for a time in the Naval Academy (1857–58) he entered the naval service in 1861 as a volunteer officer, and on the first day of his service captured a schooner, the first prize taken by the navy during the civil war. In November, 1862, he distinguished himself in leading a bold attack on the town of Jacksonville, N. C. On Oct. 27, 1864, he blew up the iron-clad ram Albemarle at Plymouth, N. C., sinking his own torpedo-boat, and barely escaping with his life, after a night and day of most perilous adventure. Throughout the war, and after its close, his bravery, ability, and coolness of judgment were very conspicuous. He died of brain fever at Washington, D. C., Dec. 17, 1874.

CUSHMAN, CHARLOTTE SAUNDERS (1816–1876), a distinguished American actress, was born at Boston, July 23, 1816. She was descended from Robert Cushman, one of the founders of Plymouth Colony. On account of her father's failure in business, she was obliged at the age of thirteen to assist in supporting the family. She sang in a church choir, and through the favor of a friend studied music in a piano-factory, though she soon had the advantage of the best instruction of the time. Having a fine contralto voice, she was called to sing in a concert with Mrs. Wood, an English operatic singer. By this lady's advice she began to practise for the opera, and appeared with her in the *Marriage of Figaro* in Boston in 1835. Miss Cushman was then apprenticed for three years to J. G. Maeder, who for a time carefully trained her, but afterwards forced her to sing soprano parts, until at New Orleans her voice completely failed her. But Mr. Caldwell, the manager who had engaged her, having observed her dramatic power, urged her to become an actress, and she made her début in his theatre as Lady Macbeth. When she returned North she made a three-years' engagement with Mr. Hamblin of the Bowery Theatre, New York, but was delayed in commencing on account of a rheumatic fever. She had acted only one week when the theatre, with her wardrobe, for which she had gone deeply in debt, was destroyed by fire. She resumed playing, however, at Albany, and the next season became a stock-actress in the Park Theatre, New York. Her sister Susan had made an unfortunate marriage, and now Charlotte induced her to appear on the stage. When the manager demurred at the increased expense, they went to Philadelphia, but were soon recalled. Miss Cushman next became a manager in Philadelphia, and when Mr. Macready came to the United States in 1843 she gave him such cordial, intelligent support in leading tragic parts, that he persuaded her to join him in his tour. Having saved some money, she resolved to go to England the next year. Mr. Macready requested her to come to Paris, where he was playing, but as he offered her only second parts, she refused unless allowed to appear at least once as Lady Macbeth. She journeyed through Scotch and English towns to London, and finally to Paris, carefully observing the style of acting as she went. A London manager met Edwin Forrest in Paris the day after Miss Cushman had left, and engaged him to appear in London with her as support. Returning to London, he secured her consent only on condition that she should appear as Bianca in Milman's tragedy of *Fazio* before the engagement with Mr. Forrest should commence. Her first appearance took place Feb. 14, 1845. Though totally unknown, she secured in this part a magnificent triumph, and for eighty-eight successive nights she appeared before the most highly cultivated audiences of England in a great variety of characters. She sent for her sister Susan, and together they spent four years in Great Britain and Ireland. That her sister might play leading parts, Charlotte assumed the chief male parts, especially playing Romeo to her Juliet. In March, 1848, Susan was married to Dr. James S. Muspratt of Liverpool, and Charlotte returned to the United States in 1849. Her first appearance after her return was in her memorable personation of Meg Merrilies in the play of *Guy Mannering*. Besides the characters already mentioned, she achieved success as Queen Catharine, Rosalind, Beatrice, Mrs. Haller, Julia in the *Hunchback*, Nancy Sykes, and Lady Teazle. She visited England again in 1852, and continued acting there till 1857. She then made a farewell tour in the United States, and went to reside in Rome with her friend Miss Emma Stebbins, the American sculptor. She was, however, induced to resume the practice of her profession occasionally, and during the American civil war acted several times for the benefit of the Sanitary Commission. The proceeds of these performances exceeded $8000. While still residing at Rome in the spring of 1869, she began to be afflicted with a tumor, and, though she twice submitted to severe operations, it was found incurable. She then returned to America, and in 1871 resumed her professional career, appearing both as a reader and as an actor. In 1874 and 1875 she visited all the principal American cities in a farewell tour, and was honored with special demonstrations by the most cultivated citizens. Her last appearance was at the Globe Theatre, Boston, May 15, 1875. She died at Boston, Feb. 18, 1876. Miss Cushman's eminent success in her profession was due not less to her conscientious labor, her unconquerable will, than to her intellectual ability. The unique character of Meg Merrilies, first assigned to her by accident in 1840, was constantly improved till it became a gem of dramatic art. The remarks of the *Times* on her first appearance in London remained true to the last: "The great characteristics of Miss Cushman are her earnestness, her intensity, her quick apprehension of readings, her power to dart from emotion to emotion with the greatest rapidity." Yet this does not express the quality which most impressed the later years of her career—the majesty of her own character, seen and felt in her personations. Her queenly nature found ample room for its proper display and highest manifestations in Shakespeare's grand characters, the pathetic Queen Katherine, the terrible Lady Macbeth. Another quality was but little known till she appeared as a professional reader—her exquisite sense of humor, and this, as is seen in the record of her life, was revealed when she was engaged in a constant struggle with an incurable malady. Her whole life was full of generous enthusiasm and self-sacrifice, and the splendid tributes that were presented to her on her retirement from the stage were a testimonial to the nobility of her private character not less than to her professional achievements. Her friend, Miss Emma Stebbins, has edited *Charlotte Cushman, her Letters and Memories of her Life*, Boston, 1878, and a brief biography by C. E. Clement appeared in 1882.

CUSTER, GEORGE ARMSTRONG (1839–1876), an

American general, was born at New Rumley, Ohio, Dec. 5, 1839. He graduated at West Point in 1861, and at once entered active service, taking part in the battle of Bull Run. When Manassas was evacuated by the Confederate troops in March, 1862, he made his first cavalry charge. At Yorktown he acted as assistant engineer in constructing earthworks, and when the enemy retreated he went with Gen. Hancock in pursuit. He was the first to cross the Chickahominy, and was made captain and aide to Gen. McClellan, and continued on his staff as long as he was in command. In 1863, Custer was engaged at the battle of Chancellorsville, and became aide to Gen. A. Pleasonton, who commanded a brigade of cavalry. He became distinguished as a dashing cavalry leader, and was made brigadier-general. At the battle of Gettysburg he routed Hampton's Black Horse cavalry. In 1864 he was with Grant in the Wilderness, and later with Sheridan in the Shenandoah Valley, distinguishing himself especially at Winchester and Cedar Creek. In February, 1865, he led the column in the raid under Sheridan, and commanded a cavalry division in the pursuit of Lee after the evacuation of Richmond. Throughout the war he never lost a gun or a flag, and captured more guns, flags, and prisoners than any other officer not commanding an army. At the close of the war he was made lieutenant-colonel with brevet rank as major-general, and was assigned to the Seventh U. S. cavalry. In 1867 he served on Gen. Hancock's expedition against the Cheyennes and Sioux, but was tried by court-martial and suspended for a year on charges of cruelty to his men and leaving his command without permission. In Sept., 1868, at the special request of Gen. Sheridan, he rejoined his regiment and took part in the winter campaign against the Cheyennes, surprising and capturing a large Indian village on the Washita. Two years were then spent in comparative quiet on the Plains, and two at Elizabethtown, Ky., his military duties being varied with travelling and writing a series of magazine articles called *My Life on the Plains*. In 1873, when his regiment was ordered to Dakota, he served in the Yellowstone expedition, and in the following year was sent to explore the Black Hills. The reports he brought back of the fertility and mineral wealth of that region greatly stimulated white immigration, and the encroachments on the Indian reservation led to trouble with the hostile Sioux under Sitting Bull. In 1876, Gen. Sheridan ordered an expedition in three columns from distant points under Gens. Terry, Gibbon, and Crook to march against them. Custer, while leading Gen. Terry's column, coming near a large Indian encampment on the Little Big Horn River, divided his regiment into three bodies, and pushed on with five companies. Major Reno, with a detachment, crossed the river some miles above, and when he was driven back the Indians concentrated on the main body in the opposite direction. Gen. Custer and all his men were killed on June 25, 1876. His body was afterwards found, not scalped. A serious dispute has arisen as to the responsibility for this massacre, some asserting that he was not properly supported or obeyed, while others lay the blame on Custer himself. The *Complete Life of Gen. G. A. Custer*, by Capt. Frederick Whittaker, was published in New York, 1876. In 1879 a statue of Gen. Custer was erected at West Point.

CUTHBERT, a town of Georgia, county-seat of Randolph co., is 18 miles E. of the Chattahoochee River, and 119 miles S. W. of Macon, on the Southwestern Railroad, at the junction of the Fort Gaines branch road. It has a court-house, a hotel, 2 weekly newspapers, 5 churches, 2 schools, and a male and female college. Population, 2326.

CUTHBERTSON, JOHN, the founder of the Covenanter Church in America, was born April 3, 1718, in Scotland, and studied theology with the Rev. John McMillan. He was ordained in 1747, and soon afterward went to Ireland and preached to the little societies of Old Dissenters or Covenanters, who had taken refuge there during the Scottish persecutions, and were scattered throughout the northern counties of the island. In the summer of 1751 he came to America to minister to the Covenanters, who had sought liberty of worship and better worldly prospects in the new world. He found not less than five hundred of this faith scattered through the country bordering upon the Susquehanna River and in the Cumberland Valley. He visited these people, and during the first month preached at eleven different stations. He held an annual communion in some central place, to which great numbers came. He went over this circuit at least once a year until the arrival of the Rev. Messrs. Dobbin and Lind in December, 1773, after which he confined his labors to parts of Chester, Lancaster, and York counties in Pennsylvania, although he was probably never installed anywhere, for he sustained a paternal rather than a pastoral relation to all the congregations which he served. He went into "the Union of 1782," which formed the Associate Reformed Church, and died March 10, 1791. He kept an accurate diary, which is still in existence, which shows that he preached on 2452 days, baptized 1806 children, married 204 couples, and rode on horseback over 70,000 miles. (J. B. S.)

CUTLER, MANASSEH, LL.D. (1742–1823), an American Congregationalist minister, was born at Killingly, Conn., May 3, 1742. He graduated at Yale College in 1765, and after spending some time in the whaling business opened a store at Edgartown, on Martha's Vineyard. He was admitted to the bar in 1767, and then removed to Dedham, where he studied theology, and in 1770 was licensed to preach. He was ordained Sept. 11, 1771, as pastor of Hamlet parish, which afterwards was incorporated as Hamilton. He entered heartily into the movements which led to the Revolution, and being made chaplain of a regiment in September, 1776, saw some service. Yet as he remained chiefly in his parish he studied medicine for the good of his people, and soon became noted for his scientific attainments. In 1781 he was made a member of the American Academy, and contributed some papers on astronomy and botany to its *Memoirs* for 1785. His botanical paper was the first scientific treatise on the plants of New England. In 1784 he, with six others, ascended the White Mountains, and they are said to have been the first white men to reach the summit. In 1786 several officers of the Revolutionary army residing in Massachusetts formed the Ohio Company to purchase public lands with the government certificates with which they had been paid. Dr. Cutler was a director of the company, and in the following year went to New York, where Congress was in session, to effect the purchase. He found that an ordinance had already been proposed for the government of the territory northwest of the Ohio, and had reached a third reading. By judicious management he secured the reference of the subject to a new committee, the majority of which were Southern men, Col. Carrington, of Virginia, being chairman. On July 11, 1787, this

committee reported a new ordinance, which is now known as the "Ordinance of 1787," and the main features of which were taken from the Constitution of Massachusetts adopted in 1780. These were evidently suggested by Dr. Cutler, and had been insisted upon as a condition of his purchase of public lands on the Ohio. The anti-slavery article was added on July 12, by Nathan Dane, the member for the Essex district of Massachusetts, in which Dr. Cutler resided. It seems to have been already approved by the committee, but to have been held back lest its insertion might endanger the passage of the act. In the plan of government proposed by Jefferson, and adopted in 1784, a similar article had been lost; but as no settlement had been made under that plan, and anti-slavery ideas were then favored by many Southern men, Congress passed the ordinance by a unanimous vote of the States represented, July 13, 1787. Two weeks later the bill authorizing the Ohio Company's purchase was passed. Dr. Cutler had secured the insertion of a proviso by which one section of every township should be reserved for the support of an educated ministry, and two townships for the establishment of a university, in addition to the proviso of the general land law of 1785 that one section should be reserved for the support of common schools. Dr. Cutler's purchase amounted to 1,500,000 acres for the Ohio Company, and 4,000,000 acres on account of other companies which were formed in imitation of it. On his return to Massachusetts the expedition to the Ohio was fitted out and started in December with a large wagon covered with black canvas, on which appeared in white letters, "Ohio, for Marietta on the Muskingum." Forty-five men went with it under engagement to settle and defend the country for three years; when they reached their destination their number had been increased to 60. Under the command of Gen. Rufus Putnam they founded Marietta, April 7, 1788. Dr. Cutler set out in the summer, and travelling in a sulky reached the Ohio, a distance of 750 miles, in 29 days. After examining the neighborhood he returned to Massachusetts, and though in 1795 offered by Washington a commission as judge of the supreme court of the Ohio Territory declined the appointment He was subsequently a member of the legislature of Massachusetts, and in 1800 was elected to Congress, where he served two terms. Then declining a re-election he devoted himself to his pastoral duties. He died at Hamilton, Mass., July 28, 1823. Three of his sons went to Ohio and were prominent in its settlement. His eldest son, Judge Ephraim Cutler, was a member of the convention which framed the first Constitution of Ohio, and effectually resisted the scheme of annulling the anti-slavery provision of the ordinance. He also drafted the judicial system of the State, and afterwards the common school system. Another son, Jervis Cutler, was the first emigrant that landed at Marietta, and was the author of a *Topographical Description of the States of Ohio, Indiana Territory, and Louisiana, comprising the Ohio and the Mississippi Rivers* (1812).

CUTLERY. Cutlery, in the United States, appears to be divided into two classes—table cutlery and pocket cutlery. The term includes all kinds of table, hunting, butchers', and cooks' knives, forks, razors, pocket-knives, scissors, and shears. Surgical, dissecting, and dental instruments are sometimes regarded as cutlery, but they more properly make a class by themselves. Nut-picks, steels, and nut-breakers for the table, artists' and shoemakers knives, are also included in cutlery, together with some smaller cutting tools. Scissors and shears, on the other hand, are sometimes included with other cutting tools under the more general name of "hardware." Spoons and steels are often sold as table cutlery, but these, with metal-ware of all kinds, knife-rests, napkin-rings, urns, pitchers, etc., are more properly included under the general name of "table-ware."

See Vol. VI. p. 646 Am. ed. (p. 733 Edin. ed.).

The cutler's art is practically a refinement of the blacksmith's or forger's art. It is based on forging and shaping upon the anvil, but adds to this art the arts of the turner and the electro-plater. While it is still carried on as a handicraft, it is in this country almost wholly a manufacture. The raw materials used in cutlery include steel for the cutting portion, or the blade, and steel, iron, brass, wood, ivory, horn, rubber, bone, shell, and celluloid for the handles. Silver, nickel, and a number of alloys are also used in ornamenting and finishing the handles of cutlery. The art of making table cutlery may be divided into three steps or stages: forging, or the heating and rough-shaping upon the anvil; tempering, to obtain hardness in the steel; grinding, to get the final shape and edge or point, and the finishing, polishing, putting on the handles, and ornamenting the blade. All of this work has for a long time been done by hand, but it is a laborious, expensive, and dangerous operation, and is very properly being superseded by manufacturing, which benefits both the workman and the buyer, giving the latter better goods for his money, and saving the former from much heavy and dangerous toil.

In American practice all the work is done in one building and at the same time, the division of labor being exceedingly minute. In the manufacture of knives and forks the steel is received in the shape of rods and bars. This is cut into lengths suitable for different knives or forks, and is sent to the forge. The forge-fires are ranged in rows and convenient to the steam-hammers and rolls, all the fires being urged by a blast brought in pipes, thus relieving the workman of all labor at the bellows. Having brought a length of steel to the proper heat in the fire, the workman places it under the hammer or in the rolls, where it is quickly brought down to the required shape. Each hammer or roll is designed to produce a certain form of blank from which one or more blades are to be formed. For instance, if the blades of a table-knife are to be made, the blank may be thin at the edges on two sides and taper regularly towards each end. Out of such a blank four blades may be cut, the longer axis forming the backs of the blades and the shorter axis the ends next the handles. Knives having steel handles may be forged under the hammer to form the blade, and more roughly shaped to make the handle. All this labor is subdivided as far as possible, one man beating and shaping one kind of blank only. After the rough-shaping comes the drop-forging, the forging into shape under the sudden blows of a drop-hammer. This brings the blank to its shape as a knife or knife-blade or fork—if a fork, the tines being as yet uncut. These forgings have the shape of the future knife or fork, but with "wings" or "fins," rough or ragged bits of metal, still clinging to the edges. These wings are removed by the next process in the die-pressing department. The presses are fitted with hardened steel dies, and cut or press the knife cold at a single blow, leaving it almost completely finished as far as shape is concerned. In shaping forks the curve given to the tines is obtained in a drop-press and with a die having

a much greater curve than that required. The elasticity of the steel causes it to return in part to its original shape, but the blow being excessive the return is only partial, and in this way the right curve is obtained without heating the blank.

The tempering of the steel is and must be performed by hand. Twenty or thirty blades are heated at once and plunged into a bath of cotton-seed oil, the oil being kept cool by a water-jacketed kettle. Knife-grinding has long been known as a most laborious and dangerous trade. Each knife and fork must be pressed against a grindstone revolving at very high speed. The operation necessitates a stooping posture over the stone and the free use of water. There is also great danger from the bursting of the stones. Fortunately, this work can now be done by machinery. Much larger stones are used, and they are driven at a safer and slower speed. The blades are placed in a brass frame and put in the machine in front of the stone. They receive a rapid sideways motion combined with a slower vertical motion, and are steadily pressed against the face of the stone. One machine will grind six or more knives at once, and do the work of thirty men in a day. The final finishing of the steel parts of the knife or fork is done upon emery-wheels and wheels of felt and cloth covered with rouge. This work, which is all done by hand, was formerly exceedingly unhealthful by reason of the dust from the wheels, but now air-pipes are laid to each wheel, with a hood partly covering the wheel, and all the sparks and dust are drawn by exhaust-fans into the pipe and blown into a large settling-room. The dust contains a large proportion of metals, and these are easily recovered and may be used again.

Many of the table-knives and forks made in this country are forged in one piece, the handle being of steel. As the whole knife or fork is to be silver-plated, this gives a firm and solid handle free from cracks or holes, and consequently more easily kept clean. For a cheaper class of table cutlery the handles are of cast iron, and may be japanned or nickel-plated. Wooden handles are always put on in two parts and secured by brass rivets. Horn, ivory, bone, shell, rubber, and celluloid handles are in one piece, and are secured to the blade in various ways. Wooden handles are sometimes ornamented with bands of white metal, and all the finer qualities of handles are carved and ornamented in various ways. The solid steel knives and forks are always silver-plated, and make the most generally useful of all cutlery. All the table-knives of whatever quality are balanced, so that the blade will not touch the cloth when they are laid upon the table.

The manufacture of pocket cutlery is essentially the same as that of table cutlery. The blades for the knives are cut from sheet steel in powerful presses. The blanks, cut to shape, are then put through drop-presses to cut the nail-mark and to straighten the blade. They are then shaped by forging and given the first grinding, which is done on large stones and by machinery. Then follows the first hand-grinding to shape the blade to a cutting edge.

The partly sharpened blades are then taken to the handle department and riveted to the handles. The steel and brass parts of the handles are cut from sheet metals, and are ground upon emery-wheels to give both the final shape and polish. The materials for pocket cutlery handles are chiefly coccoloba (a species of red wood) and cocoa-wood, horn, bone, iron, and alloys. Imitation of stag-horn is made by dyeing bone and cutting it to a roughened surface upon a lathe. After the handles are put in the blade receives a second grinding by hand to give it a cutting edge. The finishing and polishing of the metal parts of the handle and the fixing of ornaments, if they are used, and the final setting of the edge, complete the work. Machinery is used in every stage, from the stamping of the blank to the final polishing, wherever it is possible.

While the general shapes of the blades of pocket cutlery remain unchanged from year to year, the shape and ornamentation of the handles frequently change to meet the demands of a supposed taste or fashion. New styles are introduced almost every season, and there is a steady improvement in the artistic quality of the best cutlery. The designs are less conventional, and it has been found that the better the design the better the price and the more active the demand. (C. B.)

CUYAHOGA FALLS, an incorporated village of Summit co., Ohio, is on the Cuyahoga River, 32 miles south of Cleveland, on the Cleveland and Columbus Railroad. It has a town-hall, 3 hotels, a bank, a weekly newspaper, 4 churches, and 2 schools. There are also 2 foundries, a machine-shop, paper-mills, flour-mills, saw-mills, rivet-works, a tannery, potteries, and other industries. The river is here enclosed between high rocky walls and furnishes abundant water-power. It was settled in 1810, and incorporated in 1875. Its property is valued at $1,000,000, and it is free of debt. Population, 2509.

CUYLER, THEODORE LEDYARD, D. D., an American Presbyterian minister and author, was born at Aurora, Cayuga co., N. Y., Jan. 10, 1822. His father, Benjamin Ledyard Cuyler, was a lawyer in Aurora, and was descended from Hendrick Cuyler, who came from Holland to Albany in 1667. His mother was of Huguenot descent. He graduated at Princeton College in 1841, and at Princeton Theological Seminary in 1846. For three years he was the stated supply of the Presbyterian church in Burlington, N. J. In 1849 he became the first pastor of the Third Presbyterian church in Trenton, N. J. In 1853 he was called to the charge of the Reformed Dutch church in Market Street, New York, which he served for seven years. He removed to Brooklyn in 1860, and became the founder of the large and influential Lafayette Avenue Presbyterian Church, from the pastorate of which he retired in 1890. His doctorate of divinity he received from Princeton College. Dr. Cuyler is the author of *The Cedar Christian* (1859); *Heart-Life, The Empty Crib* (1868); *Thought-Hives* (1872); *Pointed Papers for the Christian Life* (1880); *God's Light on Dark Clouds* (1882); *Nile to Norway* (1881); *Wayside Springs* (1884); *Right to the Point* (1884); and many tracts and published discourses. He has contributed over 2500 articles to leading religious journals, which have had a wide circulation in this country and in Europe, and many have been translated into French, German, and other languages. They are characterized by good nature, earnest sympathy, and Christian zeal.

CYNTHIANA, a town of Kentucky, the county-seat of Harrison co., is on the South Licking River, and on the Kentucky Central Railroad, 66 miles S. of Cincinnati. It has a court-house, 2 national banks, 3 hotels, 2 newspapers, 6 churches, a female college, and several schools. In the vicinity is a noted race-course. The county is largely engaged in distilling Bourbon whiskey, and the town is the headquarters of this business. It has also 2 carriage-factories, 2 flour-mills, and a barrel-factory. It was settled in 1793, and was named from Cynthia and Anna, two daughters of William

Harrison, the first settler, who gave his name to the county. It was incorporated as a town in 1802, and as a city in 1860. On July 17, 1862, the Confederate Gen. John H. Morgan, with a force of 800 men, attacked a Union force of 500 men, chiefly State militia, and after a fierce fight captured the town, destroyed a large amount of government stores and then returned to Tennessee. On June 11, 1864, Gen. Morgan, with 1200 men, again advanced on the town, then occupied by Gen. Hobson with some Ohio regiments. The Union troops were captured and a large part of the town burnt, but in a few days the Confederates were driven out and routed by a superior force under Gen. Burbridge. After the war the town recovered its prosperity. The surrounding country is fertile and highly cultivated. Population, 2101.

CY PRÈS, in law the doctrine by which, when a gift for charitable uses cannot be applied according to the exact intention of the donor, courts of chancery apply the gift as nearly as possible (*cy près*) in conformity with the presumed general intention of the donor.

See Vol. VI. p. 657 Am. ed. (p. 745 Edin. ed.).

The doctrine of judicial *cy près* is as follows: Where a gift is made to trustees for a charitable purpose, the general nature of which is pointed out and which is lawful and valid at the time of the death of the testator, and no intention is expressed to limit it to a particular institution or mode of application, and afterwards either by change of circumstances the scheme becomes impracticable, or by change of law illegal, the fund having once vested in the charity will be applied as near the testator's particular directions as possible, to carry out his general charitable intent. Thus where a sum of money was bequeathed to aid in the publication of books, etc., to create a public sentiment in favor of the abolition of slavery in this country and to aid fugitive slaves, and after the testator's death slavery was abolished, whereby testator's immediate purpose failed, it was decreed on application to a court of chancery that the fund should be applied in aid of freedmen.

In England the doctrine of the judicial *cy près* is firmly established. In this country it is approved in some States, discarded in others, and in some has not been passed upon. In Massachusetts, Missouri, and Illinois it is regarded as in force. In New York, Connecticut, Maryland, Virginia, North Carolina, South Carolina, Alabama, Indiana, and Iowa it has been repudiated. In Maine, Vermont, New Hampshire, and Rhode Island, the question is not positively determined, but the indications are that the doctrine is in force. In New Jersey and in the courts of the United States the question is still an open one, though the tendency is against the doctrine. In Pennsylvania the whole *cy près* doctrine has been declared to have been rejected. It has, however, since been introduced to a limited extent by statute. (L. L., JR.)

CYPRESS. This is the English name of a tree known botanically as *Cupressus*, which is again but a Latinized form of its ancient Greek name, the particular species of the Greek being *Cupressus horizontalis*. The name has been taken to represent a section of the coniferous tribe of plants known as *Cupressineæ*. In this section are placed the juniper, cypress, arbor vitæ, *Cryptomeria*, or Japan cedar, *Retinispora*, *Taxodium*, or the Southern Cypress, *Callitris*, an Australian genus, and a few others of lesser note. These divisions of *Coniferæ* appear to the casual observer as well characterized, but the botanist has difficulty in expressing the differences in a manner satisfactory to himself. In the common pine there are many scales to form a cone, but in the *Cupressineæ* there are but few—sometimes not more than four—and these are arranged in opposite pairs, instead of being spirally twisted. The ovules are two, erect, and not adherent, as in the pine, to the inner face of the scale. The leaves are decussately opposite, and the branches often flattened and fan-like, while the leaves of the pine are scattered spirally round the branch, and often have the leaves in bundles from the axils of primary leaves. There are some other characters relied on by the critical botanist in careful examinations.

See Vol. VI. p. 657 Am. ed. (p. 745 Edin. ed.).

Cupressineæ are found in the northern hemisphere between the 25th and 50th parallels, and between the 30th and 45th in the southern. They do not generally grow together in immense forests, as pines do, but are scattered, and generally in company with other trees. Their value in commerce is very great, though not perhaps to so general an extent as in the case of pines and firs.

The Cypress of the ancient Greeks and Romans had two distinct forms—one, the Italian, and known as *Cupressus fastigiata*; the other, a spreading tree, *C. horizontalis*. Both of these are, however, regarded as forms of one species, *C. sempervirens* of Linnæus. They were popular in ancient gardening, and used freely in cemetery work, and were poetically used as emblems of mourning. The wood was in common use for timber, and famous for its durable quality. The gates of Constantinople, erected in the time of Constantine, were made of this wood, and in the time of Pope Eugene IV., 1100 years after, the wood was sound as when the gates were first erected. Another account says the doors of St. Peter's Church at Rome were made of this wood and erected in the time of Constantine, and were entirely sound when exchanged for brass doors in the time of Pope Eugene II. The coffins of the Athenians and mummy-cases of the Egyptians are said to have been made of Cypress wood. The tree was dedicated to Pluto and Proserpine, and a statue of Jupiter in Rome made of the wood was perfect in Pliny's time, though then 700 years old. It is probable that its first use in cemeteries was suggested by a belief that the balsamic odor emitted by the leaves was an antidote to the noxious effluvia emitted by dead bodies.

The common name, Cypress, has been transmitted to many other allied plants, though some of them have been taken from *Cupressus* or remanded to other genera by some botanists. In early American botanies the Southern Cypress was *Cupressus disticha*, and the Northern, *Cupressus thuyoides*. The former is a deciduous tree, and was called Bald Cypress, in distinction to the Northern, which is evergreen. The Bald Cypress is now recognized as *Taxodium distichum*, and, though in some botanical works the Northern is still *Cupressus thuyoides*, others style it *Chamæcyparis thuyoides*. The latter's best known common name at the present time is "white cedar" in New Jersey, where it abounds, though farther north "white cedar" is the common name of the arbor vitæ. South of the Potomac River the most common name is "juniper," true junipers being only represented there by *Juniperus Virginiana*, which is, however, popularly known as "red cedar."

The Bald Cyprus, or *Taxodium distichum*, is a well-known American tree. It inhabits swamps near

the coast from Delaware to Florida, and west to Eastern Texas. It grows from 100 to 120 feet high, and frequently exceeds 20 feet round four feet from the ground. Near the ground it is often double this size, so that platforms have to be erected when felling to save labor in cutting through the trunk. Like the Old World Cypress, the wood is very durable, posts having been known to last 100 years. It is also very light and strong, and is therefore used to make "dug-outs," or canoes, and for planking the decks of river steamboats. Its most popular use is for shingles for roofing barns and dwellings, as it has little tendency to warp or crack and will last for nearly 50 years. Squared logs are not unfrequently floated down the Mobile between 3 and 4 feet in diameter. The yield of a Cypress swamp is enormous, 200,000 feet of lumber being nothing unusual. In commerce there are three kinds—Red, Black, and White Cypress, from the color of the wood. No difference can be detected in the growing trees, and the difference is believed to result from the age of the wood or the conditions of growth. It is remarkable that while the White and Red Cypress wood is very light, the Black Cypress will not float in water. The Red Cypress is held in the highest estimation. The richer the swamp the larger the timber. In wet places the tree throws up from the roots peculiar protuberances known as "knees." These are often three or four feet high, and nearly as much in diameter. They are hollow, and have been used as bee-hives. They are generally narrow—not more than six or eight inches wide and two or three feet high, in the experience of the writer, and are produced with less freedom when the tree is growing in dry ground, and often under these circumstances are not produced at all. Cypress has less resin than the ordinary pine, but a balsam famous for healing wounds is obtained from the tree, especially from the nut-like cone. The leaves, boiled several hours, yield a cinnamon dye. In the delta of the Mississippi there are buried forests of Cypress: it is said as many as ten distinct forest-growths, with intervals of river-mud between them have been traced one above another, which seems to indicate a great antiquity for the alluvial deposit. It is said that some of these trees have been found 25 feet in circumference, and one which contained over 5000 annual rings. Based on these figures, some geologists have calculated the age of the deposits to be about 100,000 years. But there is probably some error in the calculations. A cultivated tree in the Bartram Garden near Philadelphia, measured in 1853, was 125 feet high and 20 feet in circumference four feet from the ground, and was certainly not over 100 years old. A form described in botanical works as *Taxodium Mexicanum* is found in Mexico, but is not probably distinct from the species found in the United States. It was cultivated by the ancient inhabitants of Mexico, as a famous one is recorded as being in the garden of Chapultepec, under which Cortes took shelter when, by the insurrection of the conquered, he was temporarily forced to fly from the City of Mexico with his Spanish adherents. It is known as "the Cypress of Montezuma," the king whose dynasty held sway for about three centuries before the arrival of the Spanish adventurers.

The Northern Cypress, *Cupressus thuyoides*, or "juniper" of the South, "white cedar" farther north, or with other local names, is a famous timber-tree, especially in New Jersey, where it has given rise to a distinct branch of trade known as cedar-coopering. The wood is soft, light, easily worked, and capable of a high polish, and a great variety of wooden-ware is made from it. It is also made into roofing-shingles, and serves much the same purposes as the Bald Cypress does. But it is a much smaller tree. It rarely grows more than 70 or 80 feet high. How long the Cypress will live is not exactly known; 277 circles of wood have been counted in some logs. It is believed that sometimes more than one circle of wood will be made annually in trees, but a case is recorded where a tree known to be not 50 years old had, when cut down, 47 woody circles. The tree is of comparatively rapid growth, and in New Jersey swamps they grow so thickly together that it is only with difficulty one can thread his way through them. As in the case of the Bald Cypress, there are submerged forests of these trees, and it is in some cases a profitable business to search for them and draw them through the marsh to the surface. These white cedar logs, though buried for many hundred years, are just as sound as those recently grown, and for some purposes better.

On the Pacific coast are species of Cypress of great commercial importance. *Cupressus Nutkaensis*, or yellow cedar, grows from 80 to 100 feet high. The wood has a yellowish tint, the foliage and young branchlets are of a yellowish green, and the numerous small male flowers in spring have also a yellowish cast. The wood is light and durable, and has an agreeable fragrance. The most abundant species is *Cupressus Lawsoniana*. This grows about 100 feet high, and is already in great demand for forest-planting in the Old World. The "Frankincense" Cypress of Mexico is *Cupressus thurifera*, and the "Funeral" Cypress of China, *C. funebris*. It is remarkable that this tree is used in China for cemetery purposes, just as the classical Cypress was by the old Greeks and Romans. (T. M.)

CYPRIOTE ART. Our knowledge of the place occupied by Cyprus in the history of art is due to the collection of examples of Cypriote art deposited in the Metropolitan Museum of New York. Mr. Charles T. Newton, of the British Museum, in his *Essays on Art and Archæology*, remarks, concerning Cyprus, that "the museum of New York has already been created out of its spoils." These words were written before many of its other important acquisitions had been made by the New York museum, but they imply, and justly, that its Cypriote antiquities are sufficient in themselves to constitute a museum of ancient art. And in fact, as regards the mass of objects collected from one limited region, hardly another collection is equal to this. In the variety of classes of objects and of periods represented, the Cesnola collections are also unique. The tribute paid by archæologists to their importance is due partly to the novelty of aspect and character in many cases, and to the new views of art history thus promoted; partly to the artistic or archæologic value of objects to which the aspect of pure novelty cannot be ascribed.

See Vol. VI. p. 659 Am. ed. (p. 747 Edin. ed.).

In this latter class must be numbered the collection of ancient glass which surpasses in number of pieces any individual collection in existence. As illustrative of the ancient use and combination of color in glass manufacture it contains a number of good examples. Other pieces of a white or greenish thick glass without artificial color and also without the beautiful iridescence of decay peculiar to most, are considered by Frochner (*La Verrerie Antique*) as bearing undeniable signs of primitive Phœnician art. The prejudice which credits the Phœnicians with the origination of glass manufacture is based upon an anecdote of Pliny, and opposed

by the now demonstrated antiquity of opaque and colored glass manufacture in Egypt. But the high authority just quoted considers the Phœnicians the earliest manufacturers of transparent glass, and the specimens noted are of great rarity. Most of the Cesnola glass belongs to the Roman time, with some exceptions for the Greek period; but in this department, the minute distinction of dates is in general of no great importance. For although pieces of the early periods of Eastern history are extremely rare, Egypt and Syria remained throughout antiquity important centres of manufacture and of export, and the same methods continued. Thus the Cesnola glass collection is an excellent illustration of an art common to all periods of antiquity and to all countries where ancient civilization reached. Its pieces are uniformly from tombs, whence their excellent preservation. They contained, in most cases at least, the perfumes and ointment used in the funeral rites. Traces of the latter may yet be seen in many of the objects.

From the excavation of tombs, but from a different series, was also derived the large collection of small terra-cotta lamps, belonging mainly to the Roman period. The history of Cyprus explains the conditions by which so many objects from this island belong to Greek or to Roman art. The study of art history has enabled us to view ancient art as the representation of a sequence of ever widening civilizations, which in the time of the Roman empire attained their ultimate limits. From the first century of the Empire to the opening of the Middle Ages similar methods in art and analogous subjects of design are found in Britain and in Greece, in France and in Syria, in South Germany and in Egypt, in Spain and in Asia Minor, in Italy and in North Africa, in Sicily and in Cyprus. This latest period of antiquity derived from the Greeks the preponderance of its subjects in art and its technical methods of execution and design. Thus it happens that a Cypriote collection in New York affords not only in glass and in lamps abundant illustrations of Græco-Roman civilization but also represents in a large number of statues and statuettes the same periods of art.

The works of Roman sculpture—that is, sculpture of the Roman Imperial period found in Cyprus—do not reach the best standard in any sense of the Italian and other European museums, but they belong to the same class of art and subject. The interest in ancient art is now of necessity largely turned to the work of subordinate artisans whose productions are to be judged by comparison with what a workman of the same class would originate now. From this standpoint the illustrations of sculpture of the Roman period in New York are valuable and in their way good, although mainly by inferior workmen. They represent a class of work common to the antiquity of all the countries just mentioned. They are not local but representative in character, hence their value to an American museum.

The acquisition of Cyprus by the Romans took place in the later days of the Roman republic, a little before the acquisition of Egypt and a little later than the establishment of the Roman protectorate in Syria—all events of the first century B. C. Of the other Roman provinces Asia Minor (in part), Macedonia, and Greece became Roman in the second century B. C.—North Africa and Spain after the close of the third century B. C. The acquisition of Cyprus is about contemporary with that of Gaul, and occurs before that of Britain and South Germany (first century A. D.).

The representative character of Cypriote art for antiquity in general in its Roman period being connected with a general dependence of this time in art, literature, and general culture on Greek civilization, a representative character also holds for Cypriote art in its Alexandrine-Greek period next preceding the Roman. In most respects, for example, Roman sculpture of the empire is simply a continuation of the later Greek. It differs from it only in the use of portraiture, which is rarely found in original Greek art. This dependence is connected with the incorporation under Roman organism of some of the territories just mentioned, which in changing political allegiance not only continued their civilization, but transferred it to other Roman countries. Asia Minor, Syria, and Cyprus were all thoroughly Hellenized at the time of union with Rome. It was mainly the influence of such numerous Hellenized peoples on other Roman countries which determined the Greek tendencies of all in the times of the empire. Thus we must conceive the art of Cyprus in the three centuries preceding the Roman occupation as representative of that of the same time found in Asia Minor, Syria, and Egypt (as far as Alexandria, at least, is concerned), and of the kind known as Alexandrine-Greek. This period of Cypriote art also represents a similar style which prevailed at the same time in the Greek portions of Italy, Sicily, Southern France, around the shores of the Black Sea, and in Cyrene, all territories colonized by Greeks at an early date and subject to the general laws of date and style in Greek art. For the period of Alexandrine-Greek art the Cypriote collection in New York has a number of fair examples of artisan statuary workmanship, and in life-size heads some examples of excellent style. In small terra-cotta statuettes and heads there are many very fine examples of the best work of Greek art in this class. (The changes in the history of Cyprus connected with the contentions of the Eastern Greek dynasties had no influence on its art and civilization, excepting to promote, one and all, its generally Hellenic character.)

Attention has been directed in this sketch first to the later periods of Cypriote art, to Roman or Græco-Roman, and Alexandrine-Greek, because for an American museum the representative aspects of these works are important. They are valuable, not because they belong to Cyprus, but because they are not local in character. Exactly a contrary point of view holds in general for the time preceding Alexander's conquest of the Persian empire, about 330 B. C. Of this empire Cyprus had formed a portion in common with Asia Minor, Syria, the Tigris-Euphrates valley, and countries farther east to the Indus. Although before 330 B. C. back to 550 B. C. (approximately) Cyprus was mainly under the political influence of the Persian empire, it represents for this time interesting and peculiar phases of Greek art. Greek states had existed in Cyprus before B. C. 550. They were not destroyed during the Persian period, although subjected to this foreign political influence.

The growing moral ascendency of the Greeks, as related to the East, had been gradually developing throughout the Persian empire before its conquest by Alexander the Great.

On the island of Cyprus, where the Persians were only satraps or administrators, the reacting influence of Greek art on the East is illustrated in examples of Phœnician portrait statuary under Greek influence in form and drapery. For the history of the art of

sculpture these pieces are unique and denote a phase of it otherwise unknown. Besides two Phœnician sarcophagi, in form of an Egyptian mummy-case, of great value, which have parallels in the Louvre, two others belonging to this Persian period are so far unique. One of them has been published by the French archæologist, Georges Ceccaldi, and also described by Dr. Birch, of the British Museum. Both are noticed by Mr. Newton, of the British Museum, in *Essays on Art and Archæology*. The art of the one is dominantly Asiatic in character, with a freedom of action and treatment which implies Greek influence. On the longer sides are represented chariots and processions of oriental type. At one extremity are four figures of the Phœnician Venus, at the other four figures of god Bes. The second sarcophagus represents on the longer sides a hunting-scene and a Greek banquet; at one extremity the myth of Perseus and Medusa, at the other a chariot. The style is dominantly Greek, but exhibits an Asiatic influence. (This piece was valued by Mr. A. S. Murray, of the British Museum, at $30,000.)

In these two sarcophagi are two modes of art (Eastern under Greek, and Greek under Eastern, influence), to both of which there are many corresponding statues and statuettes; and it is at this point that we distinguish objects in the Cesnola collections belonging to periods and styles otherwise known from those unknown before the Cypriote excavations of recent years. The novelty of aspect is explained by the locality of production. Cyprus, by its position near the Syrian (Phœnician) coast, and not distant from the Greek settlements of Asia Minor and the Ægean, was an important point of contact and of fusion for Greek and Eastern civilization before the time when, following Alexander's conquest, Greek culture became mistress of Western Asia, and then, under Roman organism, of the Western Mediterranean. Between these two aspects of style-fusion in Cypriote art, Eastern acting on the Greek and Greek reacting on the Eastern, it is not always possible to distinguish; but both undoubtedly exist, and instances of both can undoubtedly be specified. Of the two the action of Eastern art upon the Greek is the earliest, and the one to which attention is most important. Its consideration involves special attention to the period before 550 B. C. (beginning of the Persian rule in Cyprus), although this influence continued at least a century after this date.

In the history of Greek art the culminating point in sculpture, as in architecture, is marked by the completion of the Parthenon, at Athens, about 438 B. C. But whereas the Greek temple architecture had lived through a long period of relative perfection before this time, the development of perfection in sculpture belonged to a still living generation. Phidias, the inspirer of the sculpture art of the Parthenon, was born about 490 B. C. But the statues in Munich from the Jupiter Temple in Ægina are dated as late as 470 by high authority (Friedrichs), and they still exhibit traces of the archaic style. The reliefs from the Greek temple of Assos, in Asia Minor, distinctly archaic, are dated by some students as late as 475 B. C., and by none earlier than the 6th century. Exceedingly archaic Greek sculptured metopes from a Sicilian temple at Selinus, in Palermo, are not earlier than the 6th century—a limit fixed by the foundation of the city. The tombstone of Aristion, a warrior who died at Marathon 490 B. C. (date of the birth of Phidias) is still preserved at Athens. It is of thoroughly archaic style. Both according to modern evidence and ancient authorities Greek stone sculpture was not generally attempted until the close of the 7th century B. C., and at the opening of the 5th century was still stiff in attitude and motion. (The prehistoric Lion-gate of Mycenæ is an isolated work which has no parallel in Greek art, and is ascribed to Asiatic—Lycian or Hittite—origin). An analogy offered by the history of Italian art led students to understand in Greek art a similar long process of incubation, a similar rapid development into perfection, without conceiving its origin as at all related to foreign influences at so late a date. The archaic Greek style so far known was considered decidedly archaic *Greek*. Against it stood opposed the curiously individualized sculpture arts of Assyria and of Egypt. Historians of art either decidedly opposed the idea of an Eastern origin of Greek sculpture like Lübke, ignored the question like Schnaase, or advanced the hypothesis of an Egyptian influence like Kugler, without ability to point to the connecting links. This ignorance of the now demonstrated Eastern origin of Greek sculpture is well illustrated by reference to the third edition of Schnaase's *History of Art* (1869). In this German author of standard reputation a statuette from Cyprus is quoted as so far resembling early Greek style as to forbid the hypothesis of Phœnician derivation, whereas from the multitude of connecting links offered by the Cypriote excavations the resemblance and even identity of Phœnician art (Egyptian and Assyrian in derivation) with early Greek has been demonstrated conclusively. Prof. Sidney Colvin, in his preface to the *British Museum Photographs of the Cesnola Cypriote sculpture*, says: "It seems to be Greek art dawning under our eyes."

The backwardness of archæology, as regards the origin of Greek art, finds a double explanation in the relative infancy of scientific antiquarian study, especially of the Eastern world, and in the deficiency of excavations. It is only from the last half of the 18th century that a conception of the existence of a Greek art originated with the German Winckelmann. At the opening of the 19th century the Elgin Marbles, from the Parthenon, were stored for fourteen years in London before the British government would consent to purchase them. For this length of time the painter Haydon was the only appreciator of the school of Phidias in England. Before the time of Winckelmann the works of sculpture now termed Greek were considered Roman, and this misconception sprang from the fact that, then as now, most of the ancient statues were of Italian origin, and mainly from the city of Rome. Italian patriotism and the exclusive devotion of the 17th and 18th centuries to Latin studies had, in the absence of a critical historic science, easily fallen into this mistake. Winckelmann overthrew the methods of study which had derived the interpretations in ancient art from the Latin authors and from Roman history. He showed the existence of Greek art, by asserting and proving by new interpretations that the Roman works of sculpture were Greek copies; but he confessed himself unable to point out more than two or three original Greek works in Rome. In the absence of Greek originals the early periods of Greek sculpture could not be scientifically studied. Winckelmann himself fell into the mistake of considering the few archaic Greek works in Italy Etruscan. Of an Egyptian or Assyrian influence in early Greek sculp-

ture he is entirely ignorant, so that the first portion of his famous Art-history is now entirely valueless. In the 19th century the vast majority of Greek statues known (nearly all of the museum statues of Europe) still date from the Roman imperial period in execution, and have been found in Italy. Excavations in Greece or in Greek countries have been fragmentary and insufficient. Original Greek works of sculpture for any period are relatively rare, and therefore have been rare also for the time of origins and first development. It is thus explained how the multitude of archaic Greek works from the Island of Cyprus has been the revelation to antiquarian students of an eastern origin for Greek sculpture, which, suspected by few, had never before been demonstrated to any.

Undoubtedly at two other points Greek contact with Eastern civilization was of at least equal importance, namely, in the colonies on the shore of Asia Minor, connected by the adjacent empire of Lydia with Assyrian civilization (now conceived as having been modified by a Hittite influence and transmission centring on the upper Euphrates); and, secondly, the direct contact with Egypt through the Greek colonies in the Nile Delta after 664 B.C., as well as earlier direct contact by commerce. No remains of the Delta colonies have, however, ever been discovered; those of a connecting period in Asia Minor are rare. In Cyprus only could the direct influence of a mixture of Egyptian and Assyrian art be expected. From Cypriote art only could we argue to the enormous significance of Phœnician contact for the history of Greek art as transmitting medium for Egyptian and Assyrian influences combined. "For evidence of the early and fertilising influence of Phœnician, and through the Phœnicians of Egyptian and Assyrian ideas upon the Hellenic mind, as well as for the subsequent perpetuation and embodiment of ideas in which these elements continued in fusion as they continued nowhere else, there was likely to be no place like Cyprus. Get, if got there were to be, a sufficient number of ancient monuments from Cyprus, and therein you must have the best visible and tangible testimonies in aid of that obscure literary testimony which scholarship has so laboriously sought for, sifted, pored over and conjectured over, you must have the best clue to the primitive modes and forms in which Semitic and Egyptian ideas and arts and types of worship, as conveyed and modified through the Phœnician channels of communication, penetrated and impregnated the receptive faculties of the Greeks. Now such monuments in any bulk were long wanting; they are wanting no longer" (Sidney Colvin, *Preface to the British Museum Photographs of the Cesnola Collection*). The Greek archaic art, as previously known, is now joined by a series of connecting links as remarkable for number as for gradations of style with the art of Egypt and of Assyria.

The peculiar aspects of the Cypriote art of the 6th century B.C. and earlier are determined, then, first, by the existence in the island of a number of Phœnician colonies and settlements; second, by the existence on the island of Greek colonies and settlements (both to be conceived as partly mixing with, absorbing, or acting on a native Cypriote population allied to the Greek blood); third, by the peculiar relations of the Phœnicians on the Syrian coast to Egypt on the one hand, to the valley of the Euphrates and Tigris (Chaldea, Assyria, Babylonia) on the other.

At the time immediately preceding the rise of the Persian empire, about 550 B.C., the Tigris-Euphrates valley and the country of Syria were included in the empire of Babylonia, a name coextensive, as far as the Babylonian province is concerned, with that of Chaldea. Before 600 B.C. these Babylonian countries had been a portion of the Assyrian empire, overthrown about that time. The territorial spread of this Assyrian empire from the province of Assyria became marked after B.C. 1200. Before this time had existed an earlier empire of Babylonia, or, as it is generally called to distinguish it from the later empire, the empire of Chaldea. These political changes in the Tigris-Euphrates valley imply only modifications of minor importance in its art, which may be conceived at any time, as far as external influence is concerned, under the name of Assyrian or Assyro-Chaldean art. The interposition of the Arabian desert between the valley of the Nile and the valley of the Tigris and Euphrates made Syria the highway of intercourse and commerce between them. Especially were the coast Phœnicians of Syria, by geographical relations, directed to the mission of trading between Egypt and Assyria, and bringing to either the raw products of the other Mediterranean countries. Hence the peculiar aspects of Phœnician art, sometimes Egyptian, sometimes Assyrian in tendency, sometimes a mixture of the two. Direct control of Cyprus by Egypt after 1600, and subsequently by Assyria (demonstrably in the 8th century B. C.) must have assisted the foreign influences under Phœnician transmission.

Although stress has been laid on the importance for Greek art-history of the Cypriote remains, it is also to be remembered that Phœnician art itself is now for the first time illustrated. Reference to standard authors like Kugler (*Kunst geschichte*) or Schnaase (*Kunst geschichte*) will reveal the almost absolute dearth of Phœnician art down to the time of the Cypriote excavations. The Ægean Islands in general have already supplemented, and will certainly in the future still further supplement, the knowledge of Phœnician art and its influence on the Greek, but on account of the near connection of Cyprus with the Syrian coast, on account of the superior importance and longer duration of its Phœnician settlements, the results obtained here must always remain unrivalled.

As implied in the foregoing matter the sculpture art of Cyprus belonging to the 6th century B. C. or earlier times exhibits all grades of mixture between Egyptian and Assyro-Chaldæan art as well as independent types of either. As to the antiquity of individual pieces of sculpture, no computations back of the 6th century have as yet been made with definite certainty, although the 14th or 15th century B. C. is not considered too early a date for some pieces. The peculiar qualities of Eastern art, which as far as it can be traced back exhibits no gradual development, but in the earliest works known exhibits the highest qualities of its peculiar excellence, make the computation of dates by evidence of style alone a matter of great difficulty. On this point Mr. Sidney Colvin says: "It is impossible to be sure of the actual comparative age of some of these objects, however old and primitive they may look. Of the vast antiquity of the types to which they belong there can be no doubt whatever." (This remark applies to *sculptures* of dates earlier than the 6th century B. C.) Dr. Birch, of the British Museum, considers the 14th century B. C. not too early a date for [illegible] of Egyptian type, and there is no doubt [illegible] to that of the Cesnola collections e[illegible]ly as B. C. 2500.

A scarcely less important contribution to the history of civilization is offered by the immense quantities of pottery of early Greek and Phœnician manufacture which the Cesnola collections contain—"vases which represent entirely new features in the history of ancient pottery" (Mr. A. S. Murray, of the British Museum). Most of these pieces are related to Greek pottery already known, as the earlier Cypriote types of sculpture are related to Greek statues previously known. And once more the independent value for knowledge of Phœnician history of this immense mass of objects must be emphasized as well as its bearing on Greek history. Some of the forms found by Dr. Schliemann at Troy already had their counterparts in vase forms of very early but indefinite date among the Cypriote objects. Certain curious idols found by Dr. Schliemann at Mycenæ have also counterparts in the Cypriote terra-cottas. Of the rare terra-cotta figures from Syria in the Louvre, six out of fifteen published by Longperier (*Musée Napoleon III.*) have counterparts in New York. The recent excavations at Assos, Asia Minor, have drawn attention to an early form of Greek Centaur with human fore-legs found on the Assos temple reliefs and on Greek vases, but otherwise known only in four statuettes.

To the objects thus far mentioned must be added an important collection of ancient gold jewelry, dating in part at least as early as the 7th century B. C., and of engraved gems—"a true revelation of the history of Glyptic art" (Rev. C. W. King, of Trinity College, Cambridge). The gem collection is absolutely unique and carries back the development of Greek gem engraving to an Eastern source (Chaldæs-Assyrian) in a series of connecting specimens.

In 1869 Mr. Lang discovered at Daly (Idalium) an oblong stone with a bilingual inscription (Phœnician-Cypriote) which gave the key to the Cypriote inscriptions. In this department "Gen. di Cesnola added a great abundance of new material" (Appendix to Schliemann's *Ilios* by Prof. A. H. Sayce, Queen's College, Oxford.) The deciphering of the Cypriote inscriptions was first begun by the lately deceased Assyriologist, George Smith, of the British Museum, in 1871. Dr. S. Birch and John Brandis pushed the discovery much further (1872–73), and the inscriptions were finally made legible by the simultaneous efforts of Moriz Schmidt, W. Deecke, Justus Siegismund, and Isaac H. Hall, in 1874. The inscriptions show that the native Cypriote language is a form of the Greek, and therefore that the native Cypriote population belongs to the Aryan stock. Prof. Sayce connects the Cypriote inscriptions with an ancient syllabary once common to the whole of Asia Minor, but of which only scanty remains have been rescued by the excavations of Dr. Schliemann at Troy.

The total number of tombs opened by Gen. di Cesnola amounted to 60,932, and the sites of 15 ancient temples were explored by him, but the two specially important and unique finds were those of Golgos and Curium—the one of the entire contents in statuary of an ancient temple (Golgos); the other of an entire temple treasure, from its underground vaults (Curium). It is from the single temple of Golgos and a find in an adjoining field that nearly all the stone statues and statuettes in New York are derived. Considering their number, over 400, the variety of periods to which they belong, and the lapse of time involved—not less than a thousand years if we compute only from the 7th century B. C. to the late Roman examples—this discovery has no parallel, and yet it corresponds exactly to the conditions under which the ancient temples, from century to century, continued to increase their store of works of art. A temple was of necessity a chronological art museum; an exhibition of all the schools and periods of ancient art to which its locality rendered it accessible, and the locality of Cyprus rendered it accessible to all. As successive centuries added to its votive statues—the portraits of its priests and patrons, the figures of its deities or votive images of their worshippers—its collection became an embodied chronicle of the history of art. From various descriptions of ancient temples this character is abundantly demonstrated, as it was more or less repeated in the Cathedrals of the Middle Ages. "Thus it came to pass that in the course of ages an ancient temple became a museum of art and archæology, where in the later days of Paganism the palæographer might trace the progress of the art of writing from the earliest Cadmean specimens; the historian of art might gather materials for the classification of sculptors and painters according to schools, and the cultivated tourist might gratify his curiosity by examining relics which local tradition attributed to the heroic age; even the progress of the industrial arts from century to century might be traced by examining minutely the implements and objects fashioned by the hand of man in a range of time which in the case of some temples may be calculated at not less than a thousand years" (C. T. Newton).

Of the Artemision or temple of Diana at Ephesus the same author says: "Like other ancient temples whose worship had attained a certain celebrity during many centuries, the Artemision had in Roman times become a museum, so great was the number of works of art which had been dedicated in the temple itself and its surrounding *hieron*." Golgos is said to have been originally a Greek settlement, but the same fusion of art, of civilization, and of religion, which its statues bear to view, would explain the continued existence of this as of many other sacred shrines, through different periods of history, even if it had been originally Phœnician. (Witness, for instance, the Balbek-Roman temple of the 2d century A. D. on the identical ground-plan of the pre-historic Phœnician temple.) As always in art history, the art of Cyprus was determined rather by periods and comprehensive waves of influence than by the variety of race in its settlements. At an early time, 6th century B. C. or earlier, the Greeks made statues as did their Eastern teachers; at a later time Cypriotes and Phœnicians adopted the Greek methods which finally became dominant for all antiquity. Therefore the question as to Greek or Phœnician character of the individual colonies is an important one for the local history of Cyprus, but not for the history of art.

So far in antiquarian exploration the discovery of the statuary contents of a temple is unique, with exception of a similar but much less extensive discovery by Mr. Lang, and is doubtless explained here by the provincial character of the town and by the desertion of its site in later times. This provincial character is attested by the humble artisan execution and the inferiority of workmanship in most of the statues. This provincial character would also be one explanation of their conservation in bulk, while the contents of more famous shrines have utterly disappeared. Such shrines, belonging to localities where later city building has continued, have served as stone-quarries

until the ruin and its contents have been destroyed. The use of ancient marble statuary for the manufacture of lime has been universal in mediæval and in Turkish countries. Mr. Wood found three lime-kilns established on the ruins of the Diana temple at Ephesus. At Golgos the provincial poverty of material, a common calcareous stone, was a protection. Here only the precious votive offerings of metal will have tempted cupidity—only Christian iconoclasm would attempt destruction. Mutilation and breakage, general among the figures, is thus explained. But the overthrow of the temple once accomplished by the early Christians, the site was abandoned and all the fragments remained. Their preservation is finally explained by the peculiar construction of the temple. Sun-dried bricks of large size, turned out of wooden boxes, are still a common building material in the East. The absence of any stone above the foundation layer (which denoted a size of about 60 ft. by 30 ft.) implies that this material was used here, the building having a wooden roof, also covered with clay, which can be conjectured by the discovery among the *debris* of pieces of burnt wood and ashes. After the temple was deserted its walls and roof crumbled in over the figures, and doubtless furnished an important protection from vandalism. The statuary was found covered by a deposit of six to seven feet of earth. That the temple was a shrine of Venus is reasonably certain (Sidney Colvin). The three most important pieces of the Golgos sculptures were valued at $30,000 by the British Museum.

Whereas at Golgos the site of the temple was covered with earth, and without external indications, at Curium the temple-site was marked by columnar remains and the temple mosaic pavement easily laid bare. Reverberations which indicated a hollow space beneath led to the discovery of the vaults containing a temple treasure. By some it is conceived that the objects had been hurriedly placed here for safe-keeping on occasion of an assault on the town, which was afterwards sacked and destroyed without discovery of this deposit. A regular arrangement of objects in different chambers according to metals—gold, silver, and bronze—may or may not be inconsistent with this theory. From the vaults at Curium were taken the remarkable collection of engraved gems already mentioned, the gold jewelry already mentioned, and a number of pieces in bronze and silver. A crystal phial, with its golden lid fastened by a chain, and an agate sceptre-head, "are two objects unique of their kind" (Newton). The same may be said of the massive gold bracelets of the Paphian King Eteandrus. On these two bracelets alone a value of $10,000 has been placed. These belong to the 7th century B. C.; other objects vary in date from the 4th century B. C. to a high but indefinite antiquity.

In summing up the features of the Cesnola collections of the New York Museum it is to be noted that the geographical position of Cyprus explains their exceptionally [illegible] character and variety. Contiguous at once to [illegible], Assyro-Chaldea, Phœnicia, and the rest of Syria, Asia-Minor and the Greek Islands, colonized by Phœnicians and Greeks, ruled successively, in addition to the states of these colonists, by Egyptians, Persians, Alexandrine Greeks, and Romans, it offers, [illegible] single province of the ancient world could, [illegible] its [illegible] a connected picture of its [illegible] of all [illegible] ecting links be- [illegible] be found nowhere else in union and in sequence. The difficulties opposed by Eastern indifference and Turkish jealousy, by the expense of excavations and the uncertainty of their results, had combined to leave this unique spot of the ancient world an almost virgin ground for the explorer until 1865. General di Cesnola has by no means been the only explorer in Cyprus, but "his official position, and that tact and judgment in dealing with the local authorities which can only be acquired by living in Turkey and speaking the language of the country, carried him through many difficulties which might have baffled a less determined and a less experienced excavator, and he was thus enabled to secure and export the rich harvest of antiquities which rewarded his discoveries" (C. T. Newton).

"Where others had found one fragment he has found tons of fragments; all previous discoveries have been thrown in the shade by the American excavator." These words were penned by Prof. Sidney Colvin (of Trinity College, director of the Fitz-Williams Museum at Cambridge), some years before the discovery at Curium, of which Mr. C. T. Newton says: "It may truly be called a museum in itself," "a discovery to which there is no parallel in the annals of archæology."

The following results of excavation are catalogued from the report of Mr. John Taylor Johnston, President of the Metropolitan Museum:

Assyrian inscriptions on cylinders	4
Phœnician inscriptions on marble and terra-cotta vases	30
Cypriote inscriptions on marble and terra-cotta vases.	62
Greek inscriptions on marble and terra-cotta vases...	105
Coins, gold, silver, and copper	2,310
Vases	14,240
Statues in stone, marble, and terra-cotta	2,110
Busts and heads in marble and terra-cotta	4,200
Mortuary cippi and stelæ	138
Bas-reliefs in marble, stone, and terra-cotta	270
Sculptured sarcophagi in marble and stone	4
Engraved gems, cylinders, and scarabei	1,090
Glass bottles, plates, cups, amulets, etc	3,719
Serpentine, stone, hæmatite and Egyptian enamelled ware	472
Objects in gold	1,599
" silver	370
" copper and bronze	2,107
" alabaster and rock crystal	146
" ivory, bone, lead, and iron	217
Terra-cotta lamps	2,380

About 5000 of these objects, including the entire collection of gold, silver, and copper coins, were unfortunately lost at sea near the coast of Syria in 1871 while on their way to America.

A large and judiciously selected collection was transferred to the Ottoman government by the explorer as a royalty for the firman granted him.

Various specimens were also presented by General di Cesnola to the following museums: the Imperial Ottoman Museum at Constantinople; the Royal Museum at Munich; the Egyptian Museum at Turin; the Anthropological Museum at Turin; the Archæological Society at Athens. The Museum at Perugia, the Smithsonian Institute at Washington, and the British and St. Petersburg Museums were permitted to take casts and copies of the inscriptions.

Sales were also made of small collections (chiefly duplicates) to the museums in Berlin, Vienna, Cambridge, Boston, the Kensington Museum in London, and a few others. The remainder comprises about two-thirds of

all the objects found, including all the inscriptions and the statues, and is now the property of the Metropolitan Museum of Art (*Report of Mr. J. T. Johnston*).

The principal authorities on the Cesnola collections are *Atlas*, with descriptive matter by Prof. Ernst Curtius, by Dr. Samuel Birch, by Dr. A. S. Murray, and by Georges Perrot (Boston, 1884); Di Cesnola's *Cyprus*, with appendices by C. W. King, Cambridge, and by A. S. Murray (New York, 1878); *Sammlung Cesnola*, by Johannes Doell (St. Petersburg); *Antiquities of Cyprus selected by C. T. Newton*, with an introduction by Sidney Colvin (London, 1878); *Essays on Art and Archæology*, by C. T. Newton (London 1880); *Revue Archéologique* (January, 1875); *Monuments Antiques de Chypre*, by Georges Colonna-Ceccaldi (Paris, 1882); *Histoire de l'Art dans l'Antiquité*, vol. iii., by Perrot and Chipiez (1884). For the Cypriote inscriptions see *Numismatique et Inscriptions Chypriotes*, by the duc de Luynes (Paris, 1852); various articles in the *Trans. Soc. Biblical Archæology* (London) by Smith, Lang, Birch, and others; *Versuch zur Entzifferung der Kyprischen Schrift*, by John Brandis, in *Monatsbericht der Berlin Akademie* (1873); *Die Inschrift von Idalion*, etc., by Moriz Schmidt (Jena, 1874); *Die Wichtigsten Kyprischen Inschriften*, in G. Curtius's *Studien* (1874, vii.), by Deecke and Siegismund; "The Cypriote Inscriptions of the *Cesnola Collection*" and other articles in *Journal of Amer. Oriental Society*, by Isaac H. Hall (1874–84); *Die Griechisch-Kyprischen Inschriften*, etc., by W. Deecke, in Collitz's *Sammlung der Gr. Dialekt-Inschriften* (1873). (W. H. G.)

D.

DAA, Ludvig Kristensen, a Norwegian writer, born Aug. 19, 1809, in Saltdalen, became professor of history in Christiania in 1862. He has been very active as a writer on politics, history, and geography. In addition to a number of articles published in periodical and in pamphlets he has written: *Svensk-norsk Haandordbog* (1841); *Udsigt over Ethnologien* (1855); *Jordbeskrivilse for den norske Almue* (1857); *Om Nationaliteternes Udvikling* (1868).

DAAE, Ludvig Ludvigsson, a nephew of Ludvig Kristensen Daa, a Norwegian historian, born Dec. 7, 1834, in Aremark, near Frederikshald, where his father was a priest. After serving from 1869 as librarian he was elected professor of history in 1876. Among his larger works are found: *Throndhjems Stifts-Historie efter Reformationen* (1863); *Norges Helgener* (1879); *Norske Bygdesagn* (2 vols., 1870–72); *Det gamle Christiania* (1871); *Breve fra Danske og Norske* (1876); *Historiske Skildringer* (2 vols., 1873–78); *King Christian I.* (1879), and *Nordmœnds Udvandringer til Holland og England* (1880). With Siegwart-Petersen, Daae wrote a text-book in history, *Lærebog i Verdenshistorien* (1864–65). He is thorough and impartial.

DAHL, Konrad, a Norwegian poet, born June 24, 1843, near Throndhjem. He has been prison chaplain in Bergen since 1873. He has written a series of stories descriptive of life in the extreme north of Norway, where he lived for several years before removing to Bergen. Among them are: *Loven* (1874), a story from the Finmark fjord; *Finnegutten* (1874); *Edda Mansika* (1875), and *Ishavsskipperen* (1878).

DAHLGREN, Fredrik August, a Swedish poet and critic, born Aug. 20, 1816, in Wermland, the son of a mine-inspector. In 1841 he took the second prize of the Swedish academy for a poem *Sappho på Leukas*, in 1866 the royal prize for literary merits, and the literary prize of the academy of sciences for excellent translations. In 1871 he became "one of the eighteen." His songs are exceedingly popular and were published in two volumes in 1875–76. Among his dramas we note *Vermländingarne* (4th ed., 1879); *Ett Eventyr på Hegeberg* (1854); and *Kaffeförbudet* (1855). Among his numerous translations are found dramas from Shakespeare, Heiberg, Lessing, and others. In 1866 he published *Anteckningar om Stockholms Theatrar*, which gives a history of the Swedish theatres, and contains a list of all the dramas played from 1737 to 1863. Of *Skandinaviska Samfundets Handlingar* he edited vols. xxx.–xl. (1849–60), and of Chemnitz's *Geschichte des Schwedischen in Deutschland geführten Krieys*, vols. iii. and iv. As fruits of his remarkable industry and scholarship we also have: *Konung Erik XIV's Krönika* (1847); *Ett fornsvenskt Legendarium* (1865–74); and *Skrifter till läsning för klosterfolk* (1874–75). The last three works are published in the series of collections of the society of Swedish antiquarians, whose secretary he has been since 1843. Since 1854 he has edited the annual *Handlingar af svenska Academien*. He has proved himself an able linguist by his excellent *Ordlista öfver svenska språket* (4th ed., 1881).

DAHLGREN, John Adolf (1809–1870), an American admiral, was born in Philadelphia, Nov. 13, 1809. His father, Bernard Ulric Dahlgren, was a merchant of that city, and also consul of Sweden till his death in 1824. The son inherited his integrity and loyalty to duty. In early youth he eagerly desired to enter the navy, and a midshipman's warrant was procured for him bearing date Feb. 1, 1826. His first cruise was in the Macedonian, and after six years' service at sea he passed his examination in 1832. Owing to his mathematical proficiency, he was detailed for duty on the Coast Survey, but his sight having become impaired he was obliged to seek entire rest for nearly two years. In 1840 he resumed duty, and in 1843 went to the Mediterranean on a cruise.

Returning in 1845, he was assigned to ordnance-duty at Washington. During the sixteen years he was thus engaged, his energy and inventive genius, aided by his mathematical ability, achieved surprising results. At first he labored under great difficulties, as there was no ordnance establishment, with the exception of a small pyrotechnic laboratory, and all the appliances needed to carry out his ideas had to be constructed by himself. Under his management the naval ordnance department acquired the extensive works now in Washington. When he entered this department, gunnery included nothing but the use of solid shot and its simple accessories. Gen. Paixhans had explained his system of shells, but the cannon which he proposed was a mere auxiliary. Lieut. Dahlgren discerned and remedied this defect, and the system introduced by his scientific works revolutionized the ideas on ordnance then prevailing, and has linked his name closely with the history of that branch of military science. The Dahlgren guns were the result of invention, not of experiment. They always have stood the test of use.

In 1857, Commander Dahlgren took to sea the sloop-of-war Plymouth, equipped in such a manner as to bring into practice his innovations. He visited the coast of Europe from Portugal to Holland, and later cruised in the West Indies. In 1858 he resumed command of the ordnance department of the Washington

navy-yard. On the outbreak of the rebellion in 1861 all the other officers of the yard, with one exception, resigned and joined the Confederate service. As Commander Dahlgren remained at his post, the Government devolved upon him the charge of the defences of Washington on the left. No more responsible trust was held by any officer during the war, nor was any time more critical, for had the national capital then been lost, the consequences would probably have been irreparable Having become captain in ordinary course of promotion, Dahlgren was in July, 1862, made chief of the bureau of ordnance, a post of great responsibility.

In Feb., 1863, he was commissioned as rear-admiral, and in the following July was placed in command of the South Atlantic blockading squadron. This fleet, numbering at times over ninety vessels of war, was required to blockade a coast of 300 miles having twenty-five ports. Many questions were to be settled in regard to iron-clad vessels, and public expectation looked for the capture of Charleston. Admiral Dahlgren conducted in person the naval operations in Charleston harbor, beginning July 10, 1863, and ending Sept. 7, 1863, either himself leading or ordering by signal the nine actions in which the fleet was engaged, sometimes with the assistance of the land-forces. Morris Island and Fort Wagner were captured, and Fort Sumter reduced to a heap of ruins. During the rest of 1863, and throughout the following year, Admiral Dahlgren was chiefly engaged in maintaining with rigor and success one of the most difficult blockades known in history. He conducted a successful expedition up the St. John's River in Florida, and furnished effective aid to Gen. Sherman in his military operations in Georgia and South Carolina. There was still a public clamor for the capture of Charleston, but the final conclusion, after several councils of war with the captains of the iron-clads, was not to attempt to take it by assault. This view was approved by the Navy Department, and fully indorsed by Gen. Sherman in a letter to Admiral Dahlgren dated Feb. 14, 1865. The fleet, however, was kept in readiness and well manned for every contingency. A few days later the city was evacuated by the Confederate troops, and Admiral Dahlgren, in company with Gen. Schimmelpfennig, immediately entered the city. An expedition purely naval captured Georgetown, S. C., Feb. 24, and a week later the admiral's flag-steamer was instantly sunk by a torpedo in that harbor.

At the close of the war, in July, 1865, Admiral Dahlgren gave up the command he had held. His son, Col. Ulric Dahlgren (1842–1864), after a brief heroic career, had been killed while engaged in a cavalry-raid for the liberation of the Union prisoners in Richmond. In 1866, Admiral Dahlgren devoted a time of comparative leisure succeeding his arduous duties to the preparation of a memoir of his son, which was published in 1872. Dec. 1, 1866, the admiral sailed from New York to take command of the South Pacific squadron. While in South America he wrote a work on *Maritime International Law*, which was published after his death. In July, 1868, he resumed his place as chief of the bureau of naval ordnance, and a year later was appointed commandant of the Washington navy-yard. He died at Washington, July 12, 1870.

He published treatises on *Boat Armament* (1852), *Percussion System* (1853), *Shells and Shell Guns* (1856). His works on ordnance have been used as text-books by the Government, and his ideas have been repeated in works by other writers. His reports on armored vessels and on the coast-defences, as well as his *General Orders from 1863 to 1865*, are of great value. His biography has been written by his widow, Mrs. M. V. Dahlgren (1882). (M. V. D.)

DAHN, Julius Sophus Felix, a German historian, jurist, novelist, and poet, was born at Hamburg, Feb. 9, 1834. In the same year his father, a distinguished actor, removed to Munich, where Felix spent his youth and began the study of law. Having completed his course at the University of Berlin in 1853, he gave instruction in jurisprudence at Munich, and in 1863 he was made professor extraordinarius at Würzburg. Two years later he became full professor, and remained in the regular discharge of his duties till the outbreak of the German War in 1870. He then accompanied the army as a volunteer and took part in the battle of Sedan. In 1872 he was made professor of German law at the University of Königsberg, where he still remains. He published a popular treatise on the law of war, *Das Kriegsrecht* (Würzburg, 1870). He had previously published some legal works, and had entered upon those far-reaching investigations which are the foundation of his valuable contribution to the history of the German race. In prosecution of his labors he went to Italy, and resided for some time at Ravenna and Milan examining the records and traces of the barbarian invasions. His great work, the fruit of these researches, is *Die Könige der Germanen* (Munich and Würzburg, 6 vols., 1861–73). Other works grew out of the same labors or were carried on at the same time. Among these may be noted his treatise on *Procopius of Cæsarea* (Berlin, 1864), in which he investigates the migration of nations and the downfall of the Roman Empire; his *Westgothische Studien* (Würzburg, 1874), a full discussion of the laws and customs of the Visigoths; and his latest works—*Geschichte der Völkerwanderung* (2 vols., 1880–81); *Urgeschichte der Germanischen und Romanischen Völker* (2 vols., 1881–82); and *Aelteste Deutsche Geschichte* (1882). He has also published several volumes of poems, some of which are founded on subjects suggested by his researches, while others were intended directly to rouse the patriotic spirit of his countrymen. The earliest of these was the narrative poem, *Harald und Theano* (Berlin, 1856). The Franco-German War of 1870 furnished him occasion for numerous patriotic lyrics. Several historical novels and dramas also attest his remarkable literary activity. His *Sind Götter?* (1874), a story of the tenth century, depicts the old Norse sea-kings and the struggle between the ancient paganism of Scandinavia and the invading Christianity. *Odins Trost* (1880) is a curious mixture of the old mythology with the life of a later period. But Dahn's most popular work is the romance *Ein Kampf um Rom* (1876), which has been presented in an English dress, *A Struggle for Rome* (London, 1878). It is a tale of the sixth century, the period with which his researches had made him so familiar, and presents a vivid picture of the kingdom of the Ostrogoths in Italy and its overthrow by Belisarius. Apart from its historical value it is a powerful work of imagination.

DAHOON, in botany, Ilex Dahoon. This and *Ilex Cassine* are among the famous plants of the North American continent. In general literature *Ilex vomitoria* is also referred to in connection with the peculiarities of the other two, but this is now regarded by botanists as not essentially distinct from *Ilex Cassine*. Like the common holly, *Ilex opaca*, they are evergreen, but the leaves are not waved and spiny as in that species, and the plants seldom reach a greater height than

12 or 15 feet. Dahoon and cassine are Indian names, and the last is also called youpon. They entered largely into the religious ceremonies of the Creek Indians, who inhabited the Carolinas at the time of the settlement of the white man. William Bartram, who travelled among the Creeks about the end of the last century, notes that some chiefs took especial pains to do him great honor, and "they spent the evening in drinking cassine and smoking tobacco." He continues: "As their manner of conducting their vespers and mystical fire is extremely singular, I shall proceed to describe it. In the first place, the governor or officer who has the management of the business, with his servant attending, orders the black drink to be brewed, which is a decoction or infusion of the leaves and tender shoots of the cassine." He then describes in considerable detail the preparation for and kindling of a mystical fire by bundles of cane, which seemed to him to light up without human agency. Around the fire the chiefs and warriors are seated. Then "two slaves or servants came in together at the door, each having very large conch-shells full of the black drink, advancing with slow, uniform, and steady steps, their eyes or countenances lifted up, singing very low but sweetly; advance within six or eight paces of the king's and white people's cabins, when they step together, and each rests his shell upon a tripos or little table, but presently takes it up again, and, bowing very low, advances obsequiously, crossing or intersecting each other midway: he who rested his shell before the white people now stands before the king, and the other who stopped before the king now stands before the white people, when each presents his shell, one to the king, the other to the chief of the white people; and as soon as he raises it to his mouth the slave utters or sings two notes, each of which continues as long as he has breath; and as long as these notes continue, so long must the person drink, or at least keep the shell to his mouth." Elliott refers to the drink as always being in use at the opening of their festivals, and it is said to act on them as opium does on other races. Like opium, it excites the torpid and languid, while it calms the restless and induces sleep. Mr. Simms, however, quoted by Dr. Peyre Porcher, does not find these effects from the leaves of these hollies alone, and believes that the famous "black drink" was a compound, the knowledge of which, if ever known to any white man, is now completely lost. The plants grow only near the sea-coast. At certain seasons of the year the Indians used to come hundreds of miles and in droves to where they grew. They boiled the leaves in a large cauldron, and would drink a pint at a time, which in a short time caused them to vomit freely. They continued to drink in this way for several days, when each would take a bundle of the plant and depart to his own home. Women, according to Rafinesque, were forbidden to use it. Tea made from it is, however, regarded as equal in many respects to Chinese tea, and it is considered very little inferior to the *maté* of Paraguay, which is from an allied species, *Ilex Paraguayensis*.

According to modern physicians, the plant has excellent medicinal properties, especially in the treatment of nephritic diseases. As already noted, *Ilex vomitoria* is now regarded as identical with *I. Cassine*. *I. Cassine* and *I. Dahoon* are regarded as distinct, but their properties are so nearly alike that what refers to one can well be taken as characteristic of the other.

(T. M.)

DAIRY PRODUCTS. Abernethy was accustomed to say of milk that it was "the most nutritious of all things." Prout characterizes it as "the true type of all foods," and Dr. Carpenter observes that milk being an admixture of albuminous, saccharine, and oleaginous substances, indicates the intention of the Creator that *all these* should be employed as components of ordinary diet.

Cow's milk of average good quality has a specific gravity of 1.027 to 1.030, water being 1.000. The composition of new milk of average quality is in 100 parts as follows: water, 87.40; butter, 3.43; caseine, 3.12; milk-sugar, 5.12, and mineral matter (ash), .93.

The manufacture of food-products from milk is of very ancient origin. Butter and cheese are frequently spoken of in the Bible. They are alluded to by Homer and other writers of antiquity, and there is reason to believe that these products were made and in use for human food many ages before any record is made of them by the earliest writers. The word *dairy* is derived from the Old English word *dey*, a milk-maid, and originally denoted the place assigned to her work.

Milk contains all the elements of nutrition, and the fact that it is almost the only food which will, when used alone, support life, and maintain health and vigor for an indefinite period, together with the fact that the products made from it are not only nutritious, but are esteemed as luxuries, must always give to the dairy claims of the highest consideration.

Dairying is an important industry in Britain and upon the continent of Europe. Of the continental nations that have made a specialty of this branch of agriculture are France, Holland, Switzerland, Italy, Denmark, Sweden, and Germany. Russia has of late entered the field, and under the American system of factories is planting dairies in many parts of the empire, and pushing the industry with vigor and success.

Although Great Britain is extensively engaged in dairy husbandry, she imports largely both of butter and cheese for the home consumption of her people. According to English dairy statisticians the number of cows and heifers in milk in the British Islands in 1878 was 3,708,766, producing annually about 1,628,000,000 gallons of milk; estimating one-eighth of this as the quantity used for the rearing and fattening of calves, there remain 1,424,500,000 gallons available for human food in its various forms, milk, butter, and cheese. Now, 525,000,000 gallons of milk, it is estimated, are used directly for consumption, 350,000,000 are devoted to cheese, and 550,000,000 gallons for butter. Upon this basis the annual cheese crop of Britain is about 300,000,000 pounds of ripe cheese, and the butter product not far from 200,000,000 pounds. And yet, according to official statistics furnished by the honorary secretary of the London Board of Trade, there were imported into Great Britain during 1881 cheese to the value of £5,091,514 ($25,457,570), and butter to the value of £12,141,034, or $60,705,170.

A very large proportion of the cheese imported into Britain comes from America, while the bulk of her butter imports are from France, Holland, Denmark, and Sweden. According to Morton the annual consumption of cheese in Britain is upward of 560,000,000 pounds. This quantity, he says, represents the amount of the demand by which the English cheese industry has been created and is maintained.

The dairy industry of France is largely devoted to the production of butter, and the manufacture of soft cheeses of small size, the latter being specially adapted to home wants, and of quick consumption. Her butter exports to England are considerable, Normandy and Britany butter having been well received in English markets for a long time. French butter is also exported in considerable quantities to tropical climates, chiefly to Brazil and the South American republics. Mr. Jenkins, secretary of the Royal Agricultural Society of England, in a recent report, thus refers to the export butter trade of France: he says, "The extent of business done by some of the French butter merchants is astonishing; for instance, the firm of Lepelletier, of Carenton, whose trade is solely with England, send the butter over in their own vessels, and in 1877 their exportation exceeded 4,000 tons, and the estimated average value in France for the ten years then ended was nearly half a million sterling, per annum. They estimated that in 1878 their trade would show an increase of 30 per cent. over its average amount in the previous ten years.

"French butter is sent to market in a great variety of packages, according to the requirements of each locality. For the London market, kegs holding about 70 pounds each, crocks holding 50 pounds, and boxes containing one dozen two-pound rolls, are most frequently seen. Extreme cleanliness and refreshing neatness (amounting almost to what the French call *coquetterie*) are characteristic of all the methods, and they are further distinguished by the free and almost lavish use of clean linen linings. The kegs and linen linings cost about 1*s.* 9*d.* each; the crocks, which are protected by an outside basket and also lined with linen, cost about 2*s.* each, including everything; and the boxes, holding a dozen rolls, cost about 9*d.* each, including linen and paper. In the hottest weather the boxes are sometimes double, the space between the two boxes being filled with cotton wadding. In fact, the French butter merchants thoroughly realize the importance of delivering their wares in an attractive condition, entailing neither trouble nor waste upon the retailer."

As an instance of the success with which dairy farming is carried on in France, the small Norman department Calvados may be mentioned. It contains about 450,000 inhabitants. Here the butter made in a year is about 25,000,000 kilogrammes, or nearly 55,000,000 pounds (English), and valued at over 80,000,000 francs, or $16,000,000. Of this amount only 3,000,000 kilogrammes are consumed in the department, consequently eight times as much is manufactured as is consumed, while one-third is exported, and chiefly to England. If we add to this the quantity of cheese manufactured, we find that there are made of the Pont l'Evêque, 2,000,000 francs value; Mignot, 200,000 francs; Livarot, 4,500,000 francs; Camembert, 3,000,000 francs—total, 9,700,000 francs value, or nearly $10,000,000 in value. In other words, the cheese and butter interest of this small country reaches nearly 100,000,000 francs, or $20,000,000.

Holland butter imported into England is less esteemed now than formerly, owing, principally, to its being so largely adulterated with, or wholly manufactured from, oleomargarine. This artificial butter goes to England, and is sold under the name of "margarine" and "bosh butter," and is furnished at a low price, compared with genuine butter of the best grades. A large trade is done with this product, and it has had the effect of lowering the standard on all descriptions of butter made in Holland.

The Holland cheese most in favor in England is the Edam and Gonda. The Edam is a small spherical cheese, like a cannon-ball in shape, and weighs from 4 to 6 pounds, the rind highly colored. It is of the hard variety, as distinguished from the soft cheeses of France, with a somewhat sharp taste, and finds favor with the laboring classes of England.

Among the foreign varieties of cheese, esteemed in England, the Gorgonzola and Parmesan from Italy may be mentioned. The Gorgonzola is a very rich cheese, resembling somewhat in quality the Stilton, though differing from it in shape and style.

Denmark has of late risen to the first rank in the production of fine butter. This has been brought about by the introduction of butter factories and the practice of raising the cream on the Swartz system, or by setting the milk in ice-water. Danish butter is exported in considerable quantities to England, and brings the highest market rates. Danish butter, sealed in tins, is also sent to the South American States, where it has a deservedly high reputation on account of its excellent quality.

Switzerland is the home of the Gruyere or Sweitzer Käse, a large and rather thin cheese, not of that solid texture which distinguishes English cheese, but having numerous cavities or holes distributed through its meat. It is exported to some extent.

There are many varieties of cheese made on the Continent of Europe adapted to the tastes of the people in the countries where they are made, but for the most part they differ materially from English cheese, or from that commonly made in America,—the latter being based on models of English manufacture and adapted specially to English markets.

It is not the purpose of this article to enter upon a minute description of European dairying, or to give the various processes employed in manufacturing the different varieties of product found among the nations of that continent. The subject has been only briefly alluded to, in so far as it has a general bearing upon American dairying, and the influence which continental goods may have upon the American export trade of dairy products.

Rise and Progress of American Dairying.—American dairying, as a specialty, can be hardly considered a century old. Dairying, as a specialty, was practised in England and Holland, and in other parts of Europe, previous to the 16th century, and the early emigrants to America must have brought with them the art of butter- and cheese-making. But, previous to the year 1800, there seems to have been no considerable number of dairies grouped together, and prosecuting the business as a specialty, in any part of America.

Most farmers in those days kept a stock of horned cattle,—animals raised for beef, for working oxen, with cows for breeding purposes to supply home wants. The farming then was of a mixed character, nearly every want of the family being supplied from the farm. In the year 1800 we hear of the great co-operative cheese, made in Cheshire, Mass., under the auspices of Elder John Leland. He induced every family in his parish, and those in the country about that owned a cow, to contribute the milk produced on a certain day, that it might be massed together, and made into a cheese, as a present to President Jefferson. This cheese, when cured, weighed 1600 pounds, and its delivery to the President at Washington was the most notable affair in relation to dairying that had as yet occurred in the New World. It was about this time that some families that had emigrated from Cheshire

to Herkimer co., N. Y., began to collect small herds and to make a specialty of dairying.

From 1800 to 1826 cheese-dairying had become pretty general in Herkimer County, but the herds were mostly small. So early as 1812 the largest herds, numbering about forty cows each, were those belonging to William Ferris, Samuel Carpenter, Nathan Salisbury, and Isaac Smith, in the northern part of the county, and they were regarded as extraordinary for their size; now there are herds in the county numbering one hundred cows and over.

About a quarter of a century had now elapsed, to prove the success of dairying in Herkimer, and about this time—1826—the business began to be planted here and there in the adjoining counties, and generally by persons emigrating from Herkimer County.

The implements of the dairy were then very rude. The milking was done in open yards, and "milking barns" were unknown. The milk was curdled in tubs, the curd cut with long wooden knives, or broken with the hands, and pressed in log presses, standing exposed to the weather. The cheeses were thin and small. They were held through the season; and in the fall, when ready for market, they were packed in rough casks made for the purpose—several in a cask—and shipped to different localities, mostly for home consumption.

The total exports of cheese from the United States in 1826 were, according to the bureau of statistics at Washington, only 735,399 pounds. In 1826 Mr. Harry Burrell, of Herkimer co., N. Y., having learned something of the markets, began dealing in cheese, contracting with dairymen for their entire season's make, as was the custom in those days. He afterward became one of the largest dealers in this description of dairy goods in the United States,—often purchasing nearly the entire product made in the whole country. He was among the first to open a regular cheese-trade with England, and for many years he was the largest dealer and shipper of American cheese on this continent.

In tracing the history of cheese dairying in other States, we find the emigration of Herkimer County dairymen often gave these new localities their first impetus in this special branch of industry.

In 1847 our exports had increased to over 15,000,000 pounds, and in 1849 to 17,000,000 pounds.

Dairying had now spread over a number of counties in New York. It had obtained a firm foothold in Ohio, and was gaining an entrance in other States. The whole production of cheese that year, in the United States, was not far from 100,000,000 pounds, about 43,000,000 pounds of which were received at the tide water of the Hudson River.

British shippers had been enthusiastic, drawing from America what was then considered an extraordinary quantity; but the severe loss which they sustained in 1848-9 caused a more moderate demand the following year, and prices fell about one cent per pound, varying for fair to strictly prime, from 5 cents to 6¼ cents for Ohio choice, and 6 to 6¾ cents for New York State.

Something more than five-sixths of the cheese was bought and shipped by the middle of January; the remainder, say 2,000,000 pounds, was bought by two or three parties at 5¾ cents to 6¼ cents, which was generally thought by the trade too dear.

In 1831 the consumption of foreign cheese in Great Britain was only 14,000,000 pounds, and in 1849 it had increased to 48,000,000 pounds, being about 250 per cent. From 1849 to 1859 the exports of American cheese were not increased, and they fell back in 1853 to less than 4,000,000 pounds, and did not go much above 8,000,000 pounds until 1860. In 1859 the butter exports had reached a little more than 4,500,000 pounds, but they were nearly doubled the following year, increasing largely from year to year until 1863, when they amounted to 35,000,000 pounds. There was no increase in the production of American cheese during the ten years from 1850 to 1860, the United States census reports giving the amount in 1849 at 105,000,000 against 103,000,000 in 1859.

The quality of the great bulk of butter and cheese during this decade was undoubtedly inferior as a rule. The principles underlying the great art of manufacturing these products were very imperfectly understood, grave mistakes were made in many departments of the dairy, especially in the production of butter and the methods of packing and sending it to market.

Although Mr. Jesse Williams, of Rome, N. Y., had conceived the idea of associated dairying, and had put it in operation by erecting the first cheese-factory in 1851, it did not begin to attract attention until about 1860. Up to this date only 23 factories had been erected; but as factory cheese was generally better made, and more uniform in texture, shape, and quality, and as less labor was required in making as well as in buying (because cheese was then bought on the shelves on personal inspection), the system began to be regarded with favor by both dealers and farmers.

By 1866 the number of factories had increased to 500, and mostly in New York. At the present time, 1884, the number of cheese- and butter-factories in the United States is placed at over 4000.

Although the plan of collecting curds from the farmers, mixing them, and pressing them into cheese at a factory, had been tried as early as 1844 in Goshen, Conn., and in the State of Ohio, it had failed of success, because curds coming from different farms were not uniform in texture and could not be made into a good product. That system therefore was abandoned.

Mr. Williams was an original thinker, and to him are we indebted more than to any other for the great progressive step which places American dairying to-day in the front rank among the nations of the earth. The frame-work of the American system sprang from his fertile brain in one harmonious whole, and although he was fruitful in the invention of implements and appliances adapted to his work he took out no patents, but presented the result of his labors as a gratuity to the world. The inestimable benefits that have come, and are yet to come, from the original labors of Mr. Williams, can scarcely be estimated. It put American dairying upon a footing by which it could measure arms with any other branch of agriculture. In the State of New York it rises above all other agricultural interests; for if we add all the adjuncts of the dairy together—the value of pork made from whey and sour milk; the calves raised and beef and milk sold—we can hardly get the annual products from the dairy farms of New York below $100,000,000.

About the year 1862-63 Alanson Slaughter, of Orange co., N. Y., conceived the idea of adapting the associated system to butter-making. He arranged his creamery with pools of flowing spring water, for reducing the temperature of the milk, which he set in deep and narrow cans. This was the first butter-factory that had been built on the continent or indeed in the world. His plans were original and novel, and as the

choicest butter was made under his system, it was the commencement of the most important improvement in butter dairying hitherto known in America. This system was afterwards carried into Sweden and Denmark and other parts of Europe; it has spread over the United States and Canada, and, wherever planted, whether in the old or new world, has been the means of raising the standard of butter, and promoting its consumption in a marvellous degree.

In 1862 the butter product of the United States was about 500,000,000 pounds. In 1884 our annual product was estimated to be not far from 1,500,000,000 pounds, and since that date there has been a steady increase. An immense butter interest has been developed in Iowa, Illinois, and other parts of the West; and although the plan of setting milk has been varied in regard to deep or shallow vessels, it would have been impossible to have developed this interest to its present vast proportions, if the associated system had not been inaugurated and applied to this branch of the dairy. It promoted an inquiry and desire for better things, and consumers as they got a taste of creamery butter, with its fine grainy texture and fragrant aroma, became fond of it beyond measure, and this stimulated manufacturers to put forth their best efforts for perfection, since extraordinary prices are often paid for a "fancy article."

In 1863–64 the associated dairy system had become an established fact—an intense and widespread interest prevailed not only in New York but in Vermont, Ohio, and other States, to obtain knowledge on the subject, and this led to the inauguration of the "New York State Cheese Manufacturers' Association." A meeting was called at Rome, N. Y., Jan. 4, 1864, and the attendance filled the largest hall in that city, delegates being present from several States. No more enthusiastic gathering of those interested in agriculture had been held in the State, and people went away from the meeting with the liveliest anticipations of amassing fortunes from the dairy. That year 210 new factories were erected in the State of New York alone, and the associated system was carried into other States.

Subsequently the "Cheese Manufacturers' Association" was merged into the "American Dairymen's Association," and State dairy associations began to spring up in different States. It scarcely seems necessary to speak of the success of these associations. Thousands of people flocked to the meetings year after year. They created a dairy literature which from its wide dissemination has had a vast influence in educating the masses in this department of farming.

Contrasting the flood of light which now illumines the path of the dairyman with the meagre knowledge he possessed twenty years ago, the slough from which this industry has emerged seems infinitely deep and dark.

The associated dairy system now stretches in an almost unbroken line from the Atlantic to the Pacific. Commencing in Maine, it sweeps over New England, then through the Middle States, where it is the most important industry. Its foot is firmly planted in the West and North-west. Crossing the Mississippi, it has pushed its way into Iowa, Kansas, Nebraska, and Colorado. Even in Wyoming on the verge of the rainless region may be found cheese-factories. Along the base of the Rocky Mountains and in the cañons and parks are numerous herds and dairies. In Lake Valley, on the shores of Lake Tahoe, many large dairies had become established previous to 1875. The Mormons have been developing the business in Utah; while in California and along the Pacific coast dairies have been planted and the work has been carried on with success. At Point Reys, Cal., one proprietor has 3000 cows, divided up into herds of 100 to 150 cows each, and employed for butter-dairying. The climate here is admirably adapted to butter-making, the temperature winter and summer never varying much from 60° Fahr.

Crossing the line into Canada, we find the late Harvey Farrington—an experienced Herkimer County dairyman—in 1864–5 leading the way by building the first factories in the Province of Ontario, and teaching the art of manufacture to our Canadian neighbors. Previous to this the Canadians bought cheese largely from the United States, and during 1865 they imported from this source to the value of $200,000,—the production in Canada not being enough for her own wants. The rapid growth of this industry in Canada will be seen from the fact that in 1880, besides supplying her home consumption, she exported more than 40,000,000 pounds. Her make of cheese during the year 1888 was 65,299,751 pounds; and her export was between fifty and sixty millions of pounds. Canada is rapidly becoming a formidable competitor with the United States for the English trade.

As Great Britain has always been the chief outlet for our surplus dairy products, American dairymen have ever felt a strong desire to make such products as would be most acceptable to the English trade. Previous to 1866 American cheese had serious faults, and was much inferior to the best grades of English, and of course sold abroad at a comparatively low price. In order to obtain the best models of English manufacture and to get a correct account of the styles of cheese most acceptable in Britain, the American Dairymen's Association unanimously resolved at its annual convention in January, 1866, to send an agent abroad to study the manufacture and sale of foreign dairy produce and to make weekly reports of the markets, etc., to factories and dairymen. Mr. Willard was selected as the agent, and he went abroad in May, returning in November. After visiting all the dairy districts of England and Scotland, and going through portions of France and Switzerland, he found the best system of cheese-making, as adapted to English tastes, was that of the Cheddar variety, made in Somersetshire, England. This cheese also brought the highest price.

After studying the process of manufacture and its peculiarities, under the instruction of Mr. Joseph Harding, the noted exponent of Cheddar cheese-making in England, Mr. Willard on his return strongly urged this system upon American factorymen in his report at the annual convention of the association in 1867.

The advice and suggestions, growing out of the European mission, for the improvement and styles of American cheese were adopted, and the result proved of the greatest benefit to the cheese industry of America, her product rising to the highest grades and rivalling the very finest samples of English-made goods; while the bulk is far superior to that made in Britain.

Growth of the Dairy Industry in the United States and Canada.—According to the United States census reports of 1840 the number of milch cows in the United States was 4,837,043, and the value of dairy products is put at $33,787,008. Commissioner Wells, in his report upon the "Industry, Trade, and Commerce of the United States," for the year 1869, puts the value of dairy products of the United States at $400,000,000

per annum. Major Henry E. Alvord gives the following table of statistics from the census, which he thinks are manifestly far below the truth, the amounts consumed by producers being doubtless often omitted, at least prior to 1870:

Dairy Statistics for the United States.

Year.	No. of Cows.	Butter Made.	Cheese Made.	Milk Sold and Used.	Total Value.
		Pounds.	Pounds.	Gallons.	Dollars.
1850.....	6,392,044	313,345,306	105,535,893	.....	166,193,114
1860.....	8,585,735	460,509,854	103,875,135	.....	240,400,580
1870.....	893,332	514,092,633	162,927,379	235,500,595	360,828,000
1875.....	11,000,000	700,000,000	240,000,000	1,500,000,000	400,000,000
1880.....	12,443,120	806,672,071	243,157,850	2,000,000,000	408,000,000

The value of dairy products in the United States for the year 1890 was over $600,000,000 per annum. It may be of interest to know the States from which this enormous sum in the aggregate is obtained, and their relative importance in reference to dairying.

Of this some idea will be had from the statistics given in the last United States census (1880), which present data as collected for the year 1879:

States and Territories.	Milk sold or sent to butter and cheese-factories in 1879.	Butter made on farms in 1879.	Cheese made on farms in 1879.
	Gallons.	Pounds.	Pounds.
Alabama	267,387	7,997,719	14,091
Arizona	42,618	61,817	18,360
Arkansas	316,858	7,790,013	26,301
California	12,353,178	14,084,405	2,566,658
Colorado	506,706	860,379	10,867
Connecticut	12,289,893	8,198,995	826,195
Dakota	415,119	2,000,955	39,437
Delaware	1,132,434	1,876,275	1,712
District of Columbia	496,789	20,920	
Florida	40,967	353,156	2,406
Georgia	374,645	7,424,485	19,151
Idaho	15,627	310,644	20,295
Illinois	45,419,719	53,657,943	1,035,069
Indiana	6,723,840	37,377,797	367,561
Iowa	15,965,612	55,481,958	1,075,988
Kansas	1,360,235	21,671,762	483,987
Kentucky	2,513,209	18,211,904	58,468
Louisiana	256 241	916,089	7,618
Maine	3,720,783	14,103,966	1,167,730
Maryland	4,722,944	7,485,871	17,416
Massachusetts	29,662,953	9,655,587	829,528
Michigan	7,898,273	38,821,890	440,540
Minnesota	1,504,407	19,161,385	523,138
Mississippi	427,492	7,454,657	4,239
Missouri	3,173,017	28,572,124	283,484
Montana	41,165	403,738	55,570
Nebraska	627,783	9,725,198	230,819
Nevada	149,889	335,188	17,420
New Hampshire	5,739,128	7,247,272	807,076
New Jersey	15,472,783	9,513,835	66,518
New Mexico	10,036	41,827	10,501
New York	231,965,533	111,922,423	8,362,590
North Carolina	446,798	7,212,507	57,880
Ohio	46,801,537	67,634,263	2,170,245
Oregon	227,540	2,443,725	153,198
Pennsylvania	36,510,510	79,336,012	1,008,686
Rhode Island	3,831,706	1,007,103	67,171
South Carolina	257,186	3,196,857	16,018
Tennessee	1,006,795	17,886,369	98,740
Texas	1,296,806	13,910,393	58,466
Utah	155,263	1,052,903	126,727
Vermont	6,526,550	25,240,826	1,545,789
Virginia	1,224,469	11,470,923	85,535
West Virginia	750,279	9,369,517	100,300
Washington	226,703	1,356,103	109,200
Wisconsin	25,156,977	33,352,045	2,281,405
Wyoming	75,343	105,643	2,930
Total in United States	530,129,755	777,250,287	27,272,489

For the statistics of the cheese and butter factories of the United States see the accompanying table, compiled from the census report for 1880.

According to the census of 1881 Canada had 709 cheese-factories, employing 1574 men and 429 women and children, whose yearly wages amounted to $382,615. The total value of the raw materials used was $4,264,798, and of the articles produced $5,464,454.

The number of milch cows in the United States in 1890 was probably upwards of 15,000,000. Mr. J. R. Dodge, the statistician of the Department of Agriculture, gave the number of milch cows in the United States in December, 1880, at 12,368,053, but the more exact returns of the census showed that the estimate was about 100,000 less than the actual number.

The following table will show the value of milch cows in the United States from 1840 to 1879:

Year.	No. of Cows.	Value in Dollars.
1840.....	4,837,043	72,555,000
1850.....	6,392,044	127,840,880
1860.....	8,585,735	264,643,375
1870.....	10,023,000	324,179,093
1879.....	12,443,120	312,000,000

These returns of the census are doubtless considerably less than the annual production, as the consumption of butter, cheese, and milk in the farmer's family does not usually go upon record, and hence in many instances would not be returned. There has also been a large increase in dairying since 1879, so that the figures we have given in estimating the products of the dairy for 1890 and their value it is believed are approximately correct.

In referring to the progress of dairying in the United States a word should be added in regard to the kind of stock generally employed for milk. Up to within the last fifteen or twenty years the common cows of the country (sometimes called native in distinction to thoroughbreds or pure-blooded animals) were used almost exclusively for dairy purposes; and even up to the present time the common cow is the basis on which our dairy industry is erected. The common cow, when properly selected, with good feed and well cared for, will yield on an average from 500 to 600 pounds of cheese or, if her milk is turned into butter, from 175 to 200 pounds of butter per annum. The cows come in milk about the first of March and are dried off in December. They get rations of grain in addition to hay from the time of coming in milk until they are turned to grass. During the summer and while at pasture no additional food is given, until August, when, as pastures begin to deteriorate, fodder-corn, raised for the purpose of soiling, is fed to bridge over the dry season, or until a good bite can be had on the aftermath of meadows.

If drouths prevail or pastures fail, rations of corn-meal or ship-stuffs may be fed daily to keep up the flow of milk; but generally nothing beyond pasturage and fodder-corn is depended upon.

The milking, morning and evening, is done in the barn, and about ten cows are allotted to each milker. The winter food of cows is hay, with such coarse fodder as may be grown on the farm. Turnips and mangolds are sometimes raised and fed, but as a general rule the American dairy farmer is not a "root-grower."

Statistics of the Cheese, Butter, and Condensed Milk Factories of the United States (1880).

States and Territories.	Factories.	Capital.	Hands Employed. Men.	Hands Employed. Women & children.	Wages paid.	Milk used.	Value of materials.	Value of products.
						Pounds.		
Arizona	2	$2,100	4	2	$600	184,000	$2,760	$6,395
California	216	1,039,365	357	34	70,434	57,471,634	339,934	590,434
Colorado	2	11,000	6	.....	1,050	667,000	5,902	9,225
Connecticut	16	36,775	29	4	11,360	10,621,000	87,820	134,440
Dakota	4	10,200	3	.....	210	125,200	1,002	2,200
Delaware	3	18,200	4	4	610	620,000	4,620	7,710
District of Columbia	1	10,000	8	.....	3,300	1,825,000	36,500	44,920
Idaho	6	15,250	8	5	2,100	1,098,000	6,590	13,239
Illinois	285	933,586	631	67	233,974	316,636,778	2,840,327	3,876,085
Indiana	49	82,345	104	18	20,587	20,826,012	157,606	225,049
Iowa	244	657,508	670	125	139,813	181,635,746	1,261,316	1,736,400
Kansas	48	81,765	70	18	10,420	7,983,102	43,859	72,783
Kentucky	8	20,100	11	3	1,200	1,276,900	7,854	14,178
Maine	41	82,512	48	10	8,213	7,637,901	47,692	75,592
Maryland	14	22,950	18	.....	3,471	5,821,000	60,190	87,596
Massachusetts	22	97,550	46	6	14,277	16,671,069	128,845	194,110
Michigan	74	129,925	88	26	21,203	35,161,812	218,479	317,817
Minnesota	27	71,149	31	7	7,680	6,424,923	38,262	62,094
Missouri	30	123,990	38	19	8,464	9,185,585	65,950	96,128
Montana	3	10,250	6	.....	470	470,000	4,700	7,900
Nebraska	21	81,165	28	9	5,921	4,443,801	27,791	46,322
Nevada	2	3,200	3	.....	130	87,500	875	1,587
New Hampshire	2	10,400	1	3	780	2,539,868	20,683	27,887
New Jersey	11	42,170	30	2	8,395	9,683,992	85,491	123,063
New York	1,652	3,576,214	2,526	842	623,391	1,385,333,504	8,848,708	12,295,353
North Carolina	2	900	.....	.....	.....	19,000	152	250
Ohio	452	948,702	701	118	162,985	325,527,447	1,985,050	2,756,793
Oregon	24	192,650	32	7	6,170	3,467,942	20,233	43,216
Pennsylvania	146	395,020	253	51	51,943	98,218,237	655,368	915,468
Tennessee	2	1,800	4	1	300	198,000	1,188	1,980
Utah	11	22,402	14	6	2,035	1,645,985	12,095	21,928
Vermont	85	202,300	126	30	22,535	48,440,401	284,422	393,122
Virginia	4	33,700	8	.....	950	964,500	6,786	10,621
Washington Territory	2	16,467	8	.....	1,600	1,684,860	11,794	18,820
West Virginia	7	7,550	8	3	1,104	987,929	6,378	10,238
Wisconsin	414	613,643	497	64	98,920	181,841,161	1,036,357	1,501,087
Total	3,932	$9,604,803	6,484	1,484	$1,546,495	2,747,427,449	$18,363,579	$25,744,510

States and Territories.	Cheese Factories. Cheese made.	Cheese Factories. Value of materials.	Cheese Factories. Value of products.	Butter Factories. Butter made.	Butter Factories. Value of materials.	Butter Factories. Value of products.	Combined Butter and Skim Cheese Factories. Butter made.	Combined Butter and Skim Cheese Factories. Cheese made.	Combined Butter and Skim Cheese Factories. Value of materials.	Combined Butter and Skim Cheese Factories. Value of products.
	Pounds.			Pounds.			Pounds.	Pounds.		
Arizona	17,700	$2,640	$6,195	400	$120	$200				
California	1,154,121	70,567	122,967	2,074,344	269,367	467,467				
Colorado	64,500	5,400	8,585	2,100	502	840				
Connecticut	201,820	12,479	19,762	93,365	17,962	28,127	126,546	23,662	$32,456	$57,684
Dakota	700	70	140	5,800	932	2,120				
Delaware	.....	.....	.....	25,800	4,620	7,710				
District of Columbia	.....	.....	.....	.....	.....	.....	67,600	155,460	36,500	44,920
Idaho	97,000	6,010	12,535	3,600	580	704				
Illinois	4,977,286	336,278	462,178	2,414,668	439,600	591,604	4,136,361	15,240,839	1,803,606	2,374,562
Indiana	1,153,714	75,192	111,060	281,232	64,125	87,059	53,287	155,550	18,289	26,930
Iowa	2,302,936	138,400	215,729	5,458,595	965,304	1,304,763	724,518	473,877	157,612	215,908
Kansas	791,384	42,308	70,247	11,482	1,551	2,536				
Kentucky	.....	.....	.....	49,100	7,854	14,178				
Maine	777,365	46,852	73,942	6,000	840	1,650				
Maryland	.....	.....	.....	190,525	47,710	69,616	38,800	62,000	12,480	18,340
Massachusetts	1,093,943	65,117	99,297	52,150	18,142	28,737	92,067	277,922	34,596	47,487
Michigan	3,291,738	200,152	292,971	9,850	1,114	1,994	33,366	221,307	17,213	22,912
Minnesota	452,191	25,062	41,618	62,450	9,735	14,426	21,000	10,000	3,405	6,050
Missouri	550,265	38,334	54,219	126,884	23,020	32,989	13,980	39,800	3,996	8,920
Montana	24,500	2,450	4,000	9,000	2,250	3,240				
Nebraska	273,506	15,332	26,077	20,672	2,782	4,456	45,100	50,447	9,677	15,789
Nevada	.....	.....	.....	3,500	875	1,587				
New Hampshire	.....	.....	.....	99,068	20,683	27,887				
New Jersey	36,400	3,276	10,920	15,600	3,510	3,900	342,802	466,818	78,705	108,243
New York	108,722,852	6,375,556	8,720,490	4,197,424	626,669	870,383	4,758,354	12,078,272	1,116,372	1,652,089
North Carolina	.....	.....	.....	1,000	152	250				
Ohio	17,808,191	1,013,663	1,361,124	235,341	30,138	39,933	1,852,902	12,553,247	941,249	1,355,736
Oregon	146,534	9,869	18,518	84,500	10,364	24,668				
Pennsylvania	6,087,895	340,001	487,629	453,020	82,728	110,563	533,820	1,870,246	232,630	317,276
Tennessee	9,000	540	900	3,500	648	1,080				
Utah	140,022	10,059	18,974	12,020	2,036	2,954				
Vermont	4,575,341	282,534	389,956	5,400	600	1,100	6,837	8,500	1,287	2,066
Virginia	26,000	1,690	2,600	29,100	5,096	8,021				
Washington Territory	70,000	4,480	7,000	47,963	7,314	11,820				
West Virginia	96,687	6,378	10,238							
Wisconsin	16,806,994	932,380	1,340,860	386,010	63,401	99,673	103,281	446,919	40,576	60,554
Total in United States	171,750,495	$1(		16,471,163	$2,732,333	$3,868,235	12,956,021	44,134,866	4,540,718	$6,335,466

At the West, where grain is cheap, corn and corn-meal are extensively employed, especially for herds devoted to butter-dairying.

Of late much attention is being paid by dairymen in the introduction of pure-blooded stock of deep-milking habit. The short-horn was at one time a favorite breed, and after this came the Ayrshire. The more recent demand is for the Dutch or Holland cattle and the Jersey or Guernsey—the former for cheese-dairying and the latter for butter-making. These breeds, crossed upon the common cows, give grades that are highly esteemed, and deep milkers of more reliability are gradually being obtained.

The plan of preserving fodder in silos and feeding ensilage is being cautiously tried by a few dairymen, and the system has some strong advocates; but the majority of dairy farmers are content to look on for the present, awaiting further developments and more thorough tests as to its practical benefits and economy. The following table from "Sheldon's Dairy Farming" will show the comparative yields of milk from herds of different breeds:

Annual Yield per Cow.

	General Averages.		Best Herds.		Best Single Cows.	
	Milk.	Butter.	Milk.	Butter.	Milk.	Butter.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
"Natives"	4,606	180	4,710	186	10,458	581
Mixed herds and grades	3,658	203	5,830	242	15,043	423
Short-horns	.....	.....	6,850	290	12,815	513
Holsteins	.....	.....	11,286	308	15,960	
Ayrshires	5,146	238	5,483	274	8,596	
Jerseys	4,987	281	5,047	307	12,716	748
Swiss	.....	.....	.....	.....	9,295	611

Winter Dairying.—The plan of winter dairying originated a few years ago with Mr. Boies, of Illinois; and has been practised extensively and with great success in that State, in Iowa, and other parts of the West, where butter-making has been made a specialty.

The leading features are to have the cows come in milk during the fall, to feed high during winter, and then in the spring, when the animals naturally begin to fall off in milk, the May and June pastures send them up to nearly their full yield again. Later, as the summer drouth occurs, or as grass begins to deteriorate, the cows are "dried off" and take their rest, preparatory for the next calving. It is claimed for this system that cool weather is more favorable for the manufacture of butter than the heat of summer; that the butter-market is generally better in winter than in summer; that there is less risk of injury to butter in transportation; and, finally, that as large a product or more can be made in winter, a larger income can be realized than by summer dairying.

Fresh butter of the finest texture, flavor, and aroma has been sent to New York city from Illinois and Iowa in winter, and it has commanded the highest prices. It is this winter-butter of the West which has attracted the attention of Eastern markets by being more in demand, and by outselling summer- and fall-made goods from Eastern dairies, with which it has come into competition.

Mr. Boies, in describing his practice, says: "We dry our cows off about the first of July, and have them 'come in' fresh in the fall of the year, instead of drying them off in November, as is the general practice. We give our cows the most nourishing kind of food, and find it almost impossible to dry them off on account of its richness. The quality of feed makes a very great difference in the quality and yield of butter.

"We always milk our cows at the same time of day. In the morning we give each cow four quarts of meal, and do the milking while they are eating, after which we give them a very small amount of salt, perhaps a teaspoonful. We also give them a quart of oil-cake meal every day to assist digestion. After we are done milking, and the cows have finished eating, they are let out to drink. The *water is always warmed in winter.*

"When the weather is pleasant and warm, the cows are let out in the sun for a few hours during the middle of the day. When brought in they are fed with early-cut hay. Our hay is cut early in order to retain its natural sweetness. At 5 P. M. we give each cow five quarts of corn- and oat-meal mixed together, and then milk again. We are very careful about our stables, and enforce strict quietness in them. No striking or pounding of the cows is allowed; they are always driven quietly. We keep them warm, but avoid too high a temperature. A number of cows in a very warm stable produces an unhealthy atmosphere. We consider that there is more danger of the stable being too warm than of its being too cold."

He affirms that it does not require nearly so much milk to the pound of butter in winter as in summer; that the difference in his opinion is fully 25 per cent. in favor of winter milk; that cows would not give any more milk in summer than in winter, if properly taken care of, while in winter he gets better prices for butter.

He says his cows produce on an average 300 pounds of butter each per annum; that the manure from cattle, taken care of by his system, is of the most valuable kind, almost equal in strength to guano. Others at the West, who pursue the same plan, produce the finest kind of butter, and Mr. Boies has attained a position as a representative dairyman second to none in the West. He says the butter made on this system supplies the best hotels in the United States regularly, and is rarely ever sold under 45 cents per pound.

This system is being introduced to some extent among Eastern dairymen, and those who have tried "winter-dairying" affirm they are well satisfied with results. Where grain is cheap, as at the West, it can doubtless be carried on with great advantage, while by supplying the market with a fine fresh article consumption is promoted.

Winter-dairying is fast overturning the custom of holding butter for long periods in makers' hands—the markets more and more demanding freshly made goods which can be put into consumption in their best state.

Organizing Cheese-Factories.—The popular method of organizing factories, and which has generally given satisfaction, is to make them joint-stock concerns. The ground is selected where there is an abundance of cold spring-water; an estimate is made of buildings, machinery, and fixtures; then the whole cost is divided up into shares of fifty or one hundred dollars each. The neighboring farmers, or those favorable to the movement, take stock in proportion to the number of cows from which they are to deliver milk; officers are chosen, and the company managed on the joint-stock principle. Usually some one of the company is selected as salesman, who makes sales of cheese at best prices, makes up the dividends, and pays over their shares to

patrons whenever a sale is effected, deducting, of course, the price of manufacturing and cost of supplies, which are fixed at a point to cover any expense, including 10 per cent. on cost of buildings and fixtures.

A good cheese-manufacturer is employed as manager, either at a salary or at a certain price per pound of the cheese made. In the latter case the manager employs his own laborers, and is at all expense of running the factory, keeping record of milk as delivered, entering it in the books of the company, and on the pass-books of farmers. He also cares for the cheese while curing. He furnishes boxes, bandages, and other supplies, and puts the cheese in boxes ready for market as sales are made. The price for all this ranges from $1.35 to $2 per hundred pounds of marketable cheese, according to the size of the factory. The milk is weighed as delivered, and experience has shown that it takes about ten pounds of milk to make one pound of marketable cheese as an average through the season. The manager is employed with the understanding that he is to make a good article, and if his work is not satisfactory he is discharged, or held responsible for damages. But there is another method: one man, or a company, erects buildings, and is to bear all expense in running the factory and furnishing supplies, charging a stated sum per pound as before mentioned. In this case the manufacturer or proprietor of the factory has no claim upon the cheese, which belongs to patrons, further than taking his percentage as cheese is sold. The patrons appoint a salesman, and control the product precisely as in the first instance. In New York, and indeed in other States, milk which is to be made into cheese is rarely bought of the farmers and made up on account of the proprietor of the factory, though among the butter-factories this procedure is quite common.

Of late the plan of buying or hiring a number of factories, and having them under the control of one person, is coming into fashion. In this case the proprietor, who is generally a very skillful cheese-maker, employs a sufficient number of workmen to keep the several factories running, and by going around among them from day to day directs their management. In many instances this plan has proved a success, resulting in a uniform product for dairymen, and a profitable business for the manager.

Occasionally the milk is purchased by the proprietor, but generally he manufactures it into cheese for the dairymen at a stated rate per hundred pounds.

American Cheese-Manufacture.

The annual product of cheese in the United States is considerably over 400,000,000 pounds. The bulk of it is made in resemblance of the Cheddar of England. The characteristics of good Cheddar are mildness in flavor, having a clear, sweet, nutty taste, solidity in texture, or freedom from holes, mellowness and richness of meat, dissolving easily under the tongue, and, finally, it should possess good keeping qualities. It may be made up from uncolored milk, and is then called white, or it may be of milk artificially colored with preparations of annatto, as required by certain markets to suit the eyes of consumers.

When made from average good milk a ripe Cheddar cheese of good quality at six months old, on chemical analysis, exhibits about the following composition in 100 parts: water, 33.92; butter, 33.15; caseine, 28.12; milk sugar, lactic acid, and extractive matters, .96; mineral matters (ash), 3.85.

The quality, flavor, and goodness of cheese depends much upon the quality of milk, the manner in which it is produced, its freedom from taint and incipient decomposition when it reaches the hands of the manufacturer. It should be clean, sweet, sound, and then with proper manipulation good results may be obtained. The best milk comes from healthy cows amply fed upon old upland pastures; where nutritious grasses abound in great variety, where an abundance of clean, fresh water can be had, and is easily accessible to stock; where the animals are kindly treated, and the most scrupulous cleanliness observed in milking, in the care of dairy utensils, and in all departments of work relating to milk production.

Cheese is commonly made from the night's and morning's mess of milk mingled together. The evening's milk ought to be cooled, so as to reach a temperature of 58° or 60° Fahr. in the morning. After the morning's milk is added to the evening's mess, and well mixed together, the mass is heated from 80° to 82° Fahr., and a sufficient quantity of rennet added to produce coagulation in from 40 to 50 minutes. After the curd has attained sufficient consistency, or readily splits apart on lifting a portion with the finger, it is cut several times: first with the horizontal curd-knives and then with the perpendicular knives, a short interval intervening between each cutting. The curd-knives consist of several long thin steel blades, set about three-quarters of an inch apart, and provided with a suitable handle. The horizontal knives cut the curd in sheets, one above another, and the perpendicular knives cutting lengthwise of the vat, and then across the vat, leave the curd in small cubical blocks. The curds should be divided up fine for the season, that all parts of the mass will then be readily operated upon by heat, evenly and alike; and in order to accomplish this in the best manner, in about 20 minutes after the first cutting, and after the whey begins to form, the mass is cut again, going over with the knives three or four times in succession. This leaves the particles quite fine.

After stirring the mass with the hands and arms a few minutes, heat is applied between the vats, and the temperature of the mingled whey and curds raised gradually to about 92° Fahr., the time required being about 30 minutes, the stirring, meanwhile, being kept up, that all parts may be operated upon by heat alike. The curds are now left at rest for about 10 minutes, when half the whey is drawn off. At the expiration of this time and after the whey has been drawn off, heat is again applied as before and the mass raised gradually to a temperature of 98° Fahr., the time required being about 25 minutes, and the stirring of the curds is kept up during heating, as before described. The mass is now left at rest, with only an occasional stirring to prevent packing, until the acid begins to develop, when the remaining whey is drawn off the curds and the acid allowed to develop itself in the curds. It is very important that the development of acid be carried only to a certain point and no further, and this point must be learned by experience. Old cheese-makers are accustomed to judge of the proper degree of acidity in the curds by their feel and odor, and as a further help in this regard resort may be had to the hot-iron test. This consists in pressing a bit of curd against an iron just hot enough to make water simmer when dropped upon it. If acidity has not been carried far enough, the curd will not adhere to the iron, but if sufficiently developed it will stick to the iron,

and on pulling it away will draw out into fine threads from one to two inches long, and if too far advanced it will draw out into very fine and long threads. This test is extensively employed, and is the most accurate and reliable guide for determining the degree of acidity, or proper maturity of the curds for pressing, that can be given in a written description. Salt checks further acidity, and should now be applied at the rate of from 2½ to 2¾ pounds for every 1000 pounds of milk, in accordance with the condition of the curds as to moisture and their richness in fat; skimmed-milk-cheese having a smaller quantity of fat and a larger percentage of nitrogen, requires more salt for its preservation.

The curds, having been thrown into the sink, are spread out and one-half the salt is scattered over them as they lie in the sink, when they are turned over and the remainder of the salt applied and well mingled through the mass. The curds are now run through the curd-mill and exposed for some time to the atmosphere, and when put to press should be at a temperature of about 65 degrees Fahr. Usually the curds remain about half an hour in the hoop before pressure is applied. In the spring when hay-milk is being received and early maturity of cheese is desirable, less salt is used—from 2 to 2¼ pounds for 1000 of milk. As there is always more or less danger of allowing acidity to develop *too far* in working large masses of milk and curds, it is advisable to draw the whey early on the approach of acidity, allowing it to develop in the curds, thus having it under more perfect control. Acidity often develops with great rapidity, and in such cases it is difficult to draw off any considerable quantity of whey without having the acid carried too far, to the injury of the cheese.

The leading features of the Cheddar process may be briefly summed up as follows: first, studying the condition of the milk; second, setting it for coagulation at a temperature of from 80 to 82° Fahr.; third, drawing the whey early, or on the approach of acidity; fourth, exposing the curd a long time to the atmosphere, and allowing it to perfect its acidity after the whey is drawn; fifth, grinding the curds in a curd-mill and putting to press at a temperature of about 65° Fahr.

In the true Cheddar process, as practised by the Somersetshire dairymen, the curds are put to press before salting for about ten minutes, then taken out and run through the curd-mill, and afterwards salted. In this method the curds are more uniform as to moisture, and hence the quantity of salt can be regulated with accuracy.

A notable improvement in cheese-making machinery is the "self-acting cheese-vat," recently brought out by Mr. Wise, of Ohio. The tub consists of two parts —the outer of wood and the inner, or milk-vat, of tin, with a space between the two in which are placed pipes for heating. The wood vat is made in the shape of a tub, from 10 to 14 feet in diameter and from 20 to 22 inches deep, and strongly hooped. It is cut in the centre of the bottom, within which staves are set up of the same height as the outside. The tin is also tub-shaped and made with a core, to correspond with the wood. A shaft, upon which is fixed the agitator for stirring the curd, extends horizontally across its top to the outer edge. By means of suitable machinery, situated in the core, a radical motion about the centre of the vat is given to this shaft at the same time that it revolves upon its own axis.

The agitator is furnished with long wooden teeth which reach to the bottom of the tin vat. They are set spirally on a wooden cylinder. Thus in operation, while the agitator revolves on its own axis, the shaft by which it is carried swings about the centre of the vat, bringing it to every part of the vat, and agitating the whole mass of curd perfectly and evenly. As soon as the agitator begins to work, in the process of scalding and cooking the curds, a current is formed around the vat, which keeps every particle constantly in motion and removes the danger of uneven cooking. The motion of the agitator being uniform and steady, the curd is handled more carefully and with less loss of oily matter escaping in the whey than is usual with hand-stirring. When not in use, the agitator is readily lifted out of the curd and tipped back until it stands vertically over the centre of the vat. An arm is also provided to which knives for cutting the curd are attached.

The whey is drawn from the bottom of the vat, at a point near the outer edge. The vat is then tilted, the agitator working equally well on the incline, and keeping the curds fine and in good condition for salting.

Finally, when the salt is applied, the agitator does the stirring, incorporating the salt evenly, and leaving the curds in an excellent shape for the press. The advantage of this machine for keeping all parts of the curds exposed to the atmosphere for any length of time desired is a commendable feature which will be at once recognized by cheese-makers. The agitator does the work of the curd-mill and obviates its use.

These vats perform nearly the entire work of stirring the curds during the process of cooking and salting, by machinery dispensing with the use of an extra curd-drainer or sink, and doing the work as perfectly as it can be done, and much more perfectly than it is generally done by hand. By their use one man will easily do the work of two or three men using the common vats. There is also found to be an increased yield of cheese in consequence of their use.

Curing Cheese.—A very essential point in making fine cheese, and one that is often overlooked and neglected, is the proper method of curing. Large quantities of well-made cheese are greatly injured in the ripening on account of badly ventilated and damp rooms, as well as from rooms in which temperature cannot be controlled. In the early factories but little attention was given to controlling temperature in curing-rooms, and it is only of late that improvements in this regard are being introduced.

The Cheddar dairymen by long-continued practice and experiments have established three essential points as requisites on the curing of cheese. First, that a temperature of from 70° to 75° Fahr. is the proper range for securing mellowness in texture, sweet, clean, nutty flavor, and long-keeping qualities. Second, that this temperature must be maintained throughout the curing process, and that uneven temperatures much above and then sinking below the range named are prejudicial to fine flavor; and third, that excessive dryness of the atmosphere, like that produced from the heat of stoves, injures texture and flavor by producing a too rapid evaporation and loss of moisture in the cheese.

Take for instance the lump of curd as it comes from the press. It has been well made fr[illegible] average whole milk; we have a tough curdy-like su[illegible]nce consisting of—without assuming to be exact— [illegible] 28 [illegible] cent. of butter, 40 per cent. of water, there[illegible] and a small percentage of miner[illegible] [illegible] condition it is about as unfit for food as

Now what is required of this piece of raw curd to fit it for the palate of the fastidious cheese-eater of England? In the first place the caseine must be completely broken down and intimately mingled with the butter, while a portion of the water must be eliminated and the rest so distributed through the mass as to make the whole a homogeneous substance, mellow, plastic, delicious. The moisture must be so intimately distributed through the whole that it cannot be easily separated or distinguished from the other parts, but rather one should get the impression, when a bit of cheese is pressed under the finger or tasted in the mouth, that it is rich in butter. In addition the several parts while undergoing this change must have retained a clean, sweet, nutty flavor. Now we know by analysis how much moisture should be held in a properly cured cheese. The analysis of the very best of the Cheddar cheeses, when six months old, shows that it contains nearly 34 per cent. of water, a little more than 33 per cent. of butter, and 28 per cent. of caseine. An analysis of the best American factory cheese indicates about 27 per cent. of water, 35½ per cent. of butter, and 26 per cent. of caseine. In other words it has 2½ per cent. more butter and 7 per cent. less water than the English Cheddar, thus indicating that the 7 per cent. of moisture in the English Cheddar in excess of that in the American is made to take the place of butter, producing a more palatable and desirable cheese, and one that will sell for more money than the American in the English markets.

A record of carefully conducted experiments with cheese-curing in ordinary curing-rooms, when no regard is had to the control of temperature, is, that the June and July make, during the first 30 days of curing, will shrink or lose three times as much weight as September-made cheese during an equal space of time; thus showing that as the temperature of the weather decreases in the fall, the shrinkage also decreases. It is well known that the best American cheese is made in September when the temperature of the weather approximates more nearly to 70° than in June or July.

It may be safely assumed that in all well-cured cheese of desirable quality and flavor we must have from 30 to 33 per cent. of moisture, or else an excess of fat to compensate for the deficiency of moisture when the latter runs below 33 per cent. One of the defects complained of in American shipping cheese when well made is a tendency to dryness, and hence for the home trade a softer and more plastic sort is more in favor than the ordinary shipping cheese. Much of this home-trade cheese has the appearance of possessing an excess of fat; it is not fat, but moisture which is so intimately blended with the solids as to be taken for what the cheesemonger denominates "good stock."

One of the prominent faults in curing cheese is a too rapid evaporation of moisture in the *early stages of curing*. The water does not have a chance to assimilate with the other parts before passing off, hence dryness and apparent lack of butter. If the evaporation had been gradual, and time given for the moisture to become assimilated or "fixed," so to speak, in the cheese, the curing process would be carried on more perfectly, and the evaporation thereafter would of necessity be more slow. Again, when the fermenta-
carried on unevenly, at one time hastened by
perature and then checked by a low tempera-
cheese is apt to acquire a variety of disagree-
a. There are immense quantities of cheese, well made at first, that are seriously injured in flavor by this cause.

The best way of heating a cheese-room in cool weather is by hot-water pipes, arranged around the walls; by this means the warmth of the room is sustained in all parts alike, whereas if a stove is used some of the cheese will be too warm and the rest too cold.

A simple and effective plan for controlling temperature in cheese-curing rooms is that adopted at a factory in Whitesboro', N. Y. It is a two-storied structure 104 feet long by 30 wide, and arranged with air chambers in the walls, and with ventilators. There is no difficulty in keeping the temperature of the room between 68° and 73° during the hottest weather; and in cool weather the temperature is regulated by steam-pipes which are carried about the walls on the inside and connected with the boiler in the manufacturing department of the factory.

The construction is briefly as follows: in the side walls are four air-chambers—first the air-chamber between the outside covering and the plastered wall. Then upon this plastered wall narrow strips are set up and another wall made with lath and plaster, leaving space between the two. Again another air-chamber is formed upon this by using building paper; and, finally, the inside wall is completed by ceiling with narrow pine boards. The floor also is double, with an air-chamber between, and is provided with floor-ventilators, with wickets and wire gratings. The upper ceiling is also double with air-chambers between, provided with ventilators and wickets. Building paper isused both in the ceiling and floor. Eight double windows with blinds are on one side and six on the other. By opening or shutting the windows and arranging the ventilators the temperature in hot weather is under complete control, between 68° to 74° Fahr., or at the desired point for curing cheese in the best manner. The result has been eminently satisfactory in securing a very fine flavored product which commands a high price.

Gruyere and *Limberger* cheese are now produced in the United States, sufficient to meet the demands of our population of foreign birth. Its manufacture is confined almost exclusively to persons born in Germany and Switzerland, who learned the art of making these sorts of cheese in the fatherland. The work is carried on at factories fitted up with apparatus and implements similar to those used in Europe, and the quality of goods made is pronounced by experts to be equal in every respect to foreign-made brands. In many of these establishments the milk is purchased direct from the farmers, the price being regulated from week to week, or from month to month, according to the rates at which the common factory cheese is sold, calling ten pounds of milk as equal to one of cheese. Perhaps the most extensive district in New York devoted to the manufacture of Swiss and Limberger cheese is in Jefferson co., N. Y. Here may be found large and costly cellars, arched with stone, in which the cheese is ripened and prepared for market, this kind of structure being considered essential for developing the peculiar flavor of these varieties of cheese. Wisconsin and other parts of the West are also engaged in the manufacture.

There are a few other sorts of foreign cheese imitated successfully in the United States, but the make is quite limited. Recently an attempt has been made to introduce the manufacture of some of the soft French cheeses, such as the Neufchatel cream, etc., and with

the best results. Were these different varieties properly placed before our people, a demand would be created for them, which would soon lead to a large home-consumption, with better profits to the producer than are now realized on the great bulk of factory make.

Imitation Cheese.—This is a new variety of food of American origin, which is now attracting much attention both in this country and Europe. Ever since the introduction of creameries and butter-factories the important question of how best to utilize the skimmed milk has been before the dairy public, and has awakened a great deal of discussion and feeling, inasmuch as large quantities of poor, tough, and unpalatable cheese, made from skimmed milk, are annually thrown upon the market, and, as it is claimed, to the great injury of the trade and cheese industry of the country. Recognizing the fact that "*blue skimmed milk*," or milk deprived of all the fat that can be taken from it in butter-making, could not easily be converted into good, palatable cheese, Mr. H. O. Freeman some 10 or 12 years ago turned his attention to means for improving such milk by adding a cheaper fat to it than that which had been removed, and then turning the mixture into cheese. A low-grade butter, clarified and freed from impurities, as well also as oleomargarine oil, were used for the purpose. Patents were taken out on his process, and a number of factories were erected and run in making butter and what he called an "improved skimmed-milk cheese." The manufacture of the latter was only partially successful, there being more or less difficulty in obtaining a perfect emulsion of the oil and milk. He demonstrated the fact, however, that skimmed-cheese, under his process, could be greatly improved when made from the character of milk named; and some of his samples were commended by experts as a fairly useful article, not inferior to the lower grades of cheese made from whole milk.

Quite recently the "Cooley Emulsifying Machine," for making artificial cream out of oil and skimmed milk, has brought this project of an improved "skim-cheese" into prominence. As this invention promises to have an important bearing on the dairy industry of the country, a brief description of the process of making "imitation cheese" may be given. The milk, after its delivery at the factory, is run into large, double vats provided with an arrangement for cooling quickly with cold spring-water. The temperature of the water, of which there is an abundant supply, is 50° Fahr. The milk remains in the vats in summer—June and July—from 24 to 36 hours, and in September and October often 72 hours, the object being to get all the cream possible from the milk, as the *bluest skimmed milk* works best in its manipulation with lard or other fats for cheese-making, an explanation of which will be given further on. The quantity of butter taken from the milk in summer is at the rate of 4 pounds to the 100 pounds of milk. In the month of October, when the milk is richer, the average is 4½ pounds to the 100 of milk. The cream is churned in a large box-churn and the buttermilk added to the skimmed milk, which is then converted into cheese. In this process 1½ pounds of lard, or oleomargarine oil, in proportion to the 100 pounds of milk, is added to the skimmed milk and buttermilk, in order to compensate in part for the butter-fat removed. Butter-oil has also been employed instead of lard when prices for low-grade butter are cheap enough to make its use profitable. The butter-oil is made by clarifying poor butter so as to render it sweet. Refined cottonseed oil, known in the market as salad oil, has also been used; but preference is given to the finest description of oleomargarine as making the best cheese. One notable circumstance in adding lard to skimmed milk is that the weight of cheese from a given quantity of milk is increased, not only by the weight of lard added, but nearly as much more weight is gained by the tendency of the curds to retain moisture. In other words, if 1½ pounds of lard are added to 100 pounds of skimmed milk, it makes nearly 3 pounds more product than could be obtained from the skimmed milk if made up without any addition of fat.

By the term "blue skimmed milk" is meant milk that has yielded all the butter-fat that can be obtained from it in the usual process of setting. In the manufacture of artificial cream from lard and skimmed milk, to mix with the mass of skimmed milk and buttermilk in the vat, it is found, if the butter from the original milk has not been thoroughly removed, the lard-fat and the butter-fat do not mix well together; hence, to get a perfect emulsion of lard the best results are obtained in working with a "blue skimmed milk."

In making the "artificial cream," to be added to the skimmed milk, a machine ingeniously constructed is employed. It may be briefly described as a cylinder 6 inches in diameter, and 20 inches long, having 50,000 points cut upon its surface, and arranged in spiral courses. This cylinder is enclosed in a shell fitting closely. It stands perpendicularly in a frame, with shafting and pulley at the bottom connected with the engine, and is made to revolve at the rate of 3500 to 4000 revolutions per minute. Two tin cans with faucets stand on top of the machine, the one for the melted oil, and the other for the skimmed milk. The faucets are arranged so as to convey the contents of the cans at one point together into the machine. The oil and milk are heated together to a temperature of 130° Fahr., when the cylinder is set in motion, and the faucets are opened, allowing the milk and oil in proportion of two parts of the former to one of the latter to flow into the machine. The rapid revolution of this cylinder, the surface set with thousands of small points, causes the lard or oil to be divided into minute globules, which are encased or surrounded with the milk, making a perfect emulsion similar to the butter-globules in the original milk. Thus, the lard and milk being united form a thin cream, which flows from the machine into large tin cans, and is immediately mingled with the skimmed milk in the vat.

The milk is set at a temperature of about 90° Fahr., Hansen's extract of rennet being used at the rate of 3½ to 4 ounces extract to 1000 pounds of milk: it is preferred to have coagulation take place in about 10 minutes, and the top of the mass is gently stirred with the hands until the milk begins to thicken. The curds are cut over three times, first with the horizontal knives, and then twice with the perpendicular knives. The curds are scalded or cooked in the usual way for ordinary cheese, the temperature being raised from 94° to 100° Fahr., and from 2 to 2½ pounds of salt applied for 1000 pounds of the original milk. The time of raising heat in cooking, when the milk is all right, is from 1 to 1½ hours. The ratio of milk to a pound of cheese, calculated from the original milk, or milk as delivered at the factory, is, for June 12 pounds, July 12.6, and in October 10 pounds, for 1 of cheese. That this cheese, as to quality, flavor, and palatable-

ness, has decided merit is not to be disputed. It has been tested by the most noted experts in this country and in England, and they agree in saying that were they not told they would not have suspected its origin, nor believed that such good cheese could be produced from skimmed milk. Of course it is not equal to the finest grades of whole-milk cheese, but as it can be made to rank on an equality with second grade, and can be produced at less cost, its general manufacture among creameries, it is thought, would be to cheapen all kinds of cheese, while the markets at the same time would be relieved of a great bulk of poor "skims," which, on account of their inferior flavor and quality, check consumption.

Creamery Practice.—There is no branch of farming that has made more rapid progress during the past few years than butter-dairying. The improvement commenced with the establishment of the first butter-factories and creameries managed on the co-operative plan. Dairymen make a distinction between a butter-factory and a creamery: the first is where butter only is made, the skimmed milk going back to patrons as food for domestic animals, or is otherwise disposed of than in a manufactured product; the creamery is a place where milk is turned into butter and "skim-cheese."

The early butter-factories and creameries were organized and managed on the same plan as the cheese-factories: the latter having been in operation about 10 years before the associated system was applied to butter-dairying, and although many of these establishments are still operated upon the co-operative plan, the tendency now is to manage the manufacturing department as a separate business, in which the dairyman has no part. Under this plan the dairyman sells his milk to the factoryman at a certain rate per pound, which is usually regulated according to the price of cheese—10 pounds of milk being taken as one of cheese.

Wherever the factory system has been introduced it has raised the standard of butter to the finest grade, and the product being uniform in color, texture, and quality, has promoted consumption in a marvellous degree—the finest butters finding a market at home at prices generally too high to admit of exportation. The fact that the annual product of butter in the United States, amounting to over 1,500,000,000 pounds, is nearly all consumed at home, and that only about 40,000,000 pounds at most have in any year been exported, must be good evidence of the improved quality of this class of food. The system has not only introduced higher skill in manufacturing, but has stimulated a more thorough investigation into the causes of poor butter, and this has in turn led to new methods of setting milk and obtaining cream with a great variety of apparatus invented to meet the situation, and lessen the labor of production.

Some of the methods of setting milk introduced since the establishment of the factory system may be briefly alluded to. The first innovation was the pool and pail system. In this plan pools of flowing spring water are constructed in the milk-house, and the milk placed in pails, each having a diameter of 8 inches, and a height of 20 inches, and when filled within two or three inches of the top with milk, as delivered from the farmers, they are immersed in the pool, care being taken that the water reaches to the top of the milk-line in the pails, or a little above it. The milk remains in the pools from 24 to 36 hours, when the pails are removed and the cream dipped off with a cone-shaped vessel. The cream is then allowed to turn slightly acid, when it is churned. This plan is commonly known under the name of "deep setting," and is still practised to some extent at factories and farm-dairies.

The large shallow-pan system was next in favor. These pans are arranged in sets of four. They are made double, with space between the two for water, and pipes provided for leading cold spring-water, which is kept constantly flowing under and about the sides of the milk. Each pan is made large enough to hold the entire milk from a herd at one milking, being made of different sizes to accommodate different sized herds up to 100 or more cows. The pans are about 5 inches deep, and usually one surface foot of pan-bottom is sufficient for two cows. The method of using these pans is to put one milking of the entire dairy into one pan, adjust the water-faucet in the supply-pipe, so as to use just water enough to extract the animal heat from the milk, and keep it at the desired temperature, say at about 60° Fahr. At the time the fourth pan is wanted for use the first will be ready to skim. These pans were at one time extensively introduced among the butter-dairies of New York and in small butter-factories. Several styles of pan were manufactured, but they all embraced the one principle of "shallow-setting."

Since Swartz of Sweden made the discovery that milk when reduced to a low temperature, by being set in ice-water, would throw up its cream with great rapidity, many devices have been invented and put in use among American butter dairymen for carrying out this principle in cream-raising. Mr. Hardin, of Kentucky, was among the first to apply this principle by using a refrigerator-box, having the ice in a tank above the milk, which was set in deep cans, that were then closed, and the droppings from the ice allowed to flow on the surface of the cans, and to accumulate for two or three inches around the bottom. This led to other inventions, notably the "Cooley Creamer," where the cans of milk are completely submerged in cold water; the "Mosely Cabinet Creamery," where the cans of milk are surrounded with ice-water, and the cream obtained in from 12 to 20 hours. These and several other devices of similar construction have been widely distributed among dairymen, and on account of the simplicity of the system, the dispensing with costly milk-rooms, the exclusion of taints, and the certainty of getting cream of a uniform good character, they have been of great service in improving the butter product of the country.

Among the creameries and butter-factories, where large quantities of milk are to be handled, the most notable device recently invented are the "Burrell and Whitman Twin-Creameries," and the Marquis apparatus. The first are shaped like an ordinary cheese-vat 12 feet long, and they have two compartments in each about 16 inches wide, with a tin partition in the centre for cold water. A tube 4 inches in diameter extends longitudinally through each compartment, also for the flow of cold spring-water. This tube is adjustable, and can be raised or lowered according to the depth of milk in each compartment. When the water supplying the creamery is not sufficiently cold to lower the temperature of the milk, say from 45° to 50°, a V-shaped trough is used, which, pendent in the milk, is filled with ice. The skimmed milk is drawn from under the cream by means of a faucet at the bottom of each compartment. The capacity of the vats is from

3000 to 4000 pounds—each compartment accommodating 1500 to 2000 pounds of milk.

The Marquis apparatus is also a deep vat, similar in shape to a cheese-vat, having an adjustable cylinder running longitudinally through the vat, in which very cold water or ice-water is forced through, and causing rapid cooling of the milk. This apparatus, with some very recent improvements, is largely in use among the creameries of Eastern Pennsylvania.

Cream-gathering System.—The plan of setting milk in a uniform manner at the farm, and gathering the cream only for the factory, now extensively practised in Iowa and other parts of the West, was originated by Mr. Fairlamb, of Chicago, and is generally known as the "*Fairlamb System.*" The Fairlamb can resembles in its general appearance a tall tin pail. It is 20 inches deep, 12 inches in diameter at top and 10 inches at bottom. It stands upon three short knobs, so as to raise it an inch or two from the floor. From the centre of the bottom a four-inch tube rises perpendicularly to within 3½ inches of the top of the can, and near the top of this central tube a one-inch tube enters and runs horizontally to the side of the can. Both tubes open only on the outside of the can, the object being to create a circulation of water through them and carry off heat from the central portion of the milk. A graduated glass slot is arranged in the side of the can for the purpose of showing the depth of cream. The can is provided with a cover, having a rubber band on its edge so as to exclude anything objectionable coming in contact with the milk while the cream is rising. These cans cost about $1.50 each, and four cans are designed to be sufficient on an average for the milk of eight cows. They are intended to be set in a water-box made of common inch-boards, and which any farmer can easily construct at small cost. The cans, when filled with milk, are to be surrounded with cold spring-water, or water and ice, the same as with other plans for deep-setting. Now the Fairlamb plan of creamery is to have a building simply for receiving the cream, churning it, and packing the butter. The cream is to be raised at the farm, and the cans are so arranged as to capacity that when filled with milk and treated with water in a uniform manner, *one inch of cream*, as seen on the graduated glass in the side of the can, will make one pound of butter, and the sales of cream are so regulated.

Teams with wagons and cans for collecting the cream are connected with the factory, and are sent out daily with trusty men to measure, skim, and collect the cream. The glass on the side of the can records the quantity of cream raised, and the number of inches is credited, not only in the books of the collector, but on a book kept by the dairyman.

Among the advantages claimed for this plan are: It saves the labor of handling the milk, and the skimmed milk remains at the farm, where it can be used as food for domestic animals. As there is more or less liability of injury to milk by being carried long distances, and as its cooling and agitation tends to lessen the quantity of cream, while the time and expense in delivering milk to the factory is obviated, a considerable saving is effected.

The creamery buildings, too, need not be elaborate or expensive. The cream can be collected over a much larger territory than it would be practicable to carry the milk if delivered at one establishment. The dairyman knows from day to day what his cows are yielding, and as prices for butter are regulated from week to week, he gets the advantage of quick sales. One team in collecting cream will travel 20 miles a day, and will collect sufficient cream to make 280 pounds of butter. In Iowa, where this plan is popular, a man furnishing his own team for collecting cream is paid at the rate of about $45 per month. He measures and credits the quantity of cream when he gathers it, and notes defects, if any, or rejects that which is faulty or not properly cared for. In Illinois the cream-gatherer furnishing team, etc., gets a little higher wages than that named. In other States a company or individual builds a creamery and furnishes cans to farmers, buying the cream at prices agreed upon from week to week, according to the price ruling for butter. That is to say, the whole cost of collecting the cream, making the butter, with packages, salt, etc., is calculated, and the dairyman is paid so much less per inch of cream or pound of butter as this cost amounts to, the price of butter being regulated by highest quotations in markets.

The expense of manufacturing butter in a large factory on this system is said to be about two cents per pound. The dairyman under this system generally realizes considerable more money than he could were he to manufacture his butter on the farm and sell it on his own account. High skill being employed at the factory, a very fine and uniform product is made, which sells in the market as *creamery butter* instead of *dairy*, and hence commands the highest price. This change in the grade of butter makes a decided increase in the money income of a community.

In the practical consideration of starting a creamery or butter-factory the capital required is perhaps of the first importance. The complete creamery, fitted to receive whole milk, sell milk or cream, or make both butter and cheese, costs the most. Such a factory for 500 cows requires a capital of from $4000 to $6000. A butter-factory where whole milk is handled, though taking less room and less labor, if no cheese is made, costs but little less. But a Fairlamb factory for the same number of cows, built new and fully equipped, need not cost over $2500; and if suitable buildings can be rented for the purpose, it may be fitted up for $1000 to $1200.

The Centrifugal Cream-extractor.—The most recent and striking method of obtaining cream from milk is by the use of the "Centrifugal Creamer," which separates the cream from milk immediately after being drawn from the cow, by subjecting it to rapid centrifugal motion. These machines, of German origin, were greatly improved in Denmark by Messrs. Neilson & Peterson, who brought out what is known as the "Danish Centrifugal Milk Separator." The principle on which they work in separating cream from milk has attracted great attention in Europe and on this side of the Atlantic.

Cream is of less specific gravity than milk, and for this reason it rises to the surface when milk is set aside for creaming. Now the action of centrifugal force is to throw the heaviest material farthest from the centre. By placing new milk in a cylinder and revolving it rapidly, the heaviest portion (the skimmed milk) is thrown to the circumference, and the lighter portion (the cream) remains nearest the centre. It is upon this principle that the centrifugal milk separator is constructed, the main features of the invention consisting in the means taken to draw off the cream and skimmed milk continuously, or as fast as they are separated. In other words, there is a constant stream of whole milk entering the revolving cylinder, and two streams, one of cream and one of skimmed milk, flowing from it.

At the International Dairy Exhibition in New

York in 1879, an American centrifuge, the invention of D. M. Weston, of Boston, was in operation. His first machine was perfected that year and put to work by Mr. Edward Burnett, at his Deerfoot Farm, Massachusetts, and has been doing work ever since.

Now although it has been clearly demonstrated that a larger percentage of cream can be obtained from milk by this method than by any other known plan of setting milk, and also that a great advantage is gained by having the skimmed milk perfectly fresh and sweet—the limited capacity of the early machines for handling large quantities of milk quickly, together with the high cost and expense of running, have not generally commended them for use among the practical butter-makers of America. Recognizing these objections, Mr. Weston has been actively engaged to devise methods of improvement, and by combining the merits of the Danish and Weston machines produced the "Danish Weston Centrifugal Milk Separator," which has a capacity of separating 1200 pounds of milk per hour. This and the DeLaval Separator, of equal capacity, have been largely sold in different parts of the country in recent years. Such a separator is considered an essential part of a good factory equipment. The introduction of this machine is one of the great progressive steps of modern dairying.

Churning and Working Butter.—The following process is adopted for making the finest descriptions of butter at large creameries in New York: the cream is removed from the milk when sweet, and is allowed to become slightly acid before churning, and in order to bring about this change it is heated to 70° Fahr. It goes to the churn at a temperature of from 58° to 62° Fahr., and at seasons when the color is not naturally deep enough, butter color is mixed with the cream at the rate of 3 ounces to 500 quarts of cream. The churn now considered best is a revolving box-churn with no inside gearing or fixtures, and is revolved by machinery. By the use of his style of churn the butter assumes a granulated form, so as to be easily washed and freed from buttermilk. Ice is broken up and put in the churn just before the butter begins to granulate. After the butter has come the buttermilk is drawn off and the butter washed with water at a temperature of about 50° in hot weather and 58° Fahr. in cold weather. The churn is revolved a few times and then the water is drawn off. This operation is repeated, the butter getting three washings. The butter is now taken from the churn and salt is worked in with Mason's power butter-worker, which is esteemed one of the best machines yet brought out for handling large quantities of butter. This worker consists of a circular and revolving table, upon which two rollers, one corrugated and one plain, are made to revolve at one point. Owing to the revolving table and fluted roller there is no sliding or rubbing of the butter and the grain is not injured. The table is on an incline, allowing the buttermilk to run off. Each roller runs parallel with the table; the corrugated roller brings the butter to an even thickness, and the smooth one does the working.

The butter is salted at the rate of 20 ounces best English salt to 25 pounds of butter. In working, lumps of butter, weighing 12½ pounds each, are placed on the revolving table, and each lump gets 10 ounces of salt sprinkled upon it. The butter after it passes under the rollers is thrown up in a heap, and then passes under the rollers again. This is repeated till it has passed under the rollers four times, when it is considered sufficiently worked to incorporate the salt. The lumps are now thrown into tubs and placed in a cold storage-room until next morning, when they are taken out, worked over again, and packed in oak tubs or firkins made in the best manner. In the second working the butter is run under the rollers and manipulated two or three times over, or so as not to show streaks, but to be of an even color throughout.

Chemically considered, butter is a mixture of oleine and palmitine, with a trace of phosphate and other salts and certain odoriferous fats and oils, from which it derives flavor. The following table will show the average composition of milk and the products derived from it in the process of butter-making:

Constituents.	New Milk.	Skimmed Milk.	Cream.	Butter-milk.	Butter Unsalted.
Fat (butter)	4.00	0.55	35.00	1.67	85.00
Albuminoids, caseine and albumen	3.25	3.37	2.20	3.33	0.51
Milk sugar	4.50	4.63	3.05	4.61	0.70
Various salts	0.75	0.78	0.50	0.77	0.12
Water	87.50	90.64	59.25	89.62	13.67
Total	100.00	100.00	100.00	100.00	100.00

For full treatment of all topics relating to the dairy and to the various processes of butter- and cheese-making, with illustrations of implements and machinery, see *Willard's Practical Dairy Husbandry*, *Willard's Practical Butter Book*, *Arnold's American Dairying*, and *Sheldon's Dairy Farming*.

Condensed Milk.—The manufacture of this important product is being gradually increased in the United States by the erection of factories in different sections. The growth of the business has been slow compared with that of other milk products for several reasons, besides its limited use and demand for consumption. The chief of these reasons are: the high cost of building and fitting up a factory with suitable machinery; the complicated nature of the work, and the difficulty of obtaining skilled managers and competent workmen in the manufacturing department; lack of general information in regard to methods of manufacture, which have been kept secret as far as possible from the public; and, finally, lack of knowledge generally concerning the trade, and the difficulty of competing with old and established companies that have controlled the business.

The cheese- and butter-factories are always open for inspection, and managers are always ready to give information concerning processes of manufacture and new improvements, while books are published conveying information on all desirable points. The press also is constantly discussing matters relating to butter and cheese. Not so with condensed milk manufacture. The business and processes are not freely explained to the public, but are confined for the most part to persons interested in or operating the factories. About the only treatise on this branch of the dairy is that written by Mr. X. A. Willard for the Royal Agricultural Society of England, and printed in its journal, and in pamphlet in 1871, reference to which is made for those desiring more specific information on the subject than can be given here.

The history of experiments for condensing milk in America dates back to 1846. Possibly the idea of reducing milk to a solid may have occurred earlier in Europe, but if experiments were made they were not

successful, or at least were of no practical importance. Preparations under the names of "Desiccated Milk," "Milk Powders," and "Milk Essence" have been in the market, but they were all too imperfect to meet the conditions required for general introduction. They were articles prepared from milk, and not the actual milk itself.

To the late Gail Borden, of White Plains, N. Y., must be awarded the credit of being the first who was successful in putting upon the market genuine milk in a condensed form, milk which would keep for long periods, and which could be readily brought back to its original consistence simply by the addition of water. A man of intense energy and unyielding tenacity of purpose, an inventor of great ingenuity if not of remarkable scientific attainments, he added to all this the enthusiasm of the philanthropist, who believed that preserved milk would be a boon to humanity. As long ago as 1849 he began his experiments, conducted simultaneously with others, whose aim was the preservation of meats. It was not until 1853 that he arrived at the conviction that he had obtained the quality he had been seeking. Meanwhile he had expended energy, time, and quite a fortune in his experiments, for he at length saw that, to experiment to advantage, a large amount of material, involving much expense, must be used.

At an early stage of his experiments he decided that milk could not be preserved in a dry form, as "desiccated," or "powdered," or solidified, but must be left in a semi-liquid state. That some preservative agent must be added, and that nothing but water must be removed, also became apparent.

The result is that condensed milk as now known to the trade and consumers consists of milk from which only water has been taken, and to which nothing but sugar has been added. The product is of the consistency of honey, and by dilution with water it is easily reconverted into milk itself, somewhat sweetened. It may be stated here that all the *dry preserved milk* requires to be dissolved in *hot* water, while the condensed milk prepared under the Borden system readily dissolves in *cold* water.

By 1861 Mr. Borden had extensively introduced his preparation, and four or five factories were in operation, capable of producing 5000 one-pound cans per day. During the war of the rebellion large quantities were required for the Northern armies. This gave an impetus to the trade, at the same time that the shipping trade steadily increased.

About 1857 Mr. Borden put into the market for city use what he called "Plain Condensed Milk." This is prepared in the same way as the other except that no sugar is added, and it is not hermetically sealed. It will remain sound for from one to two weeks according to the temperature in which it is kept, and it is so convenient as well as economical that large quantities have been used for consumption in New York and other cities.

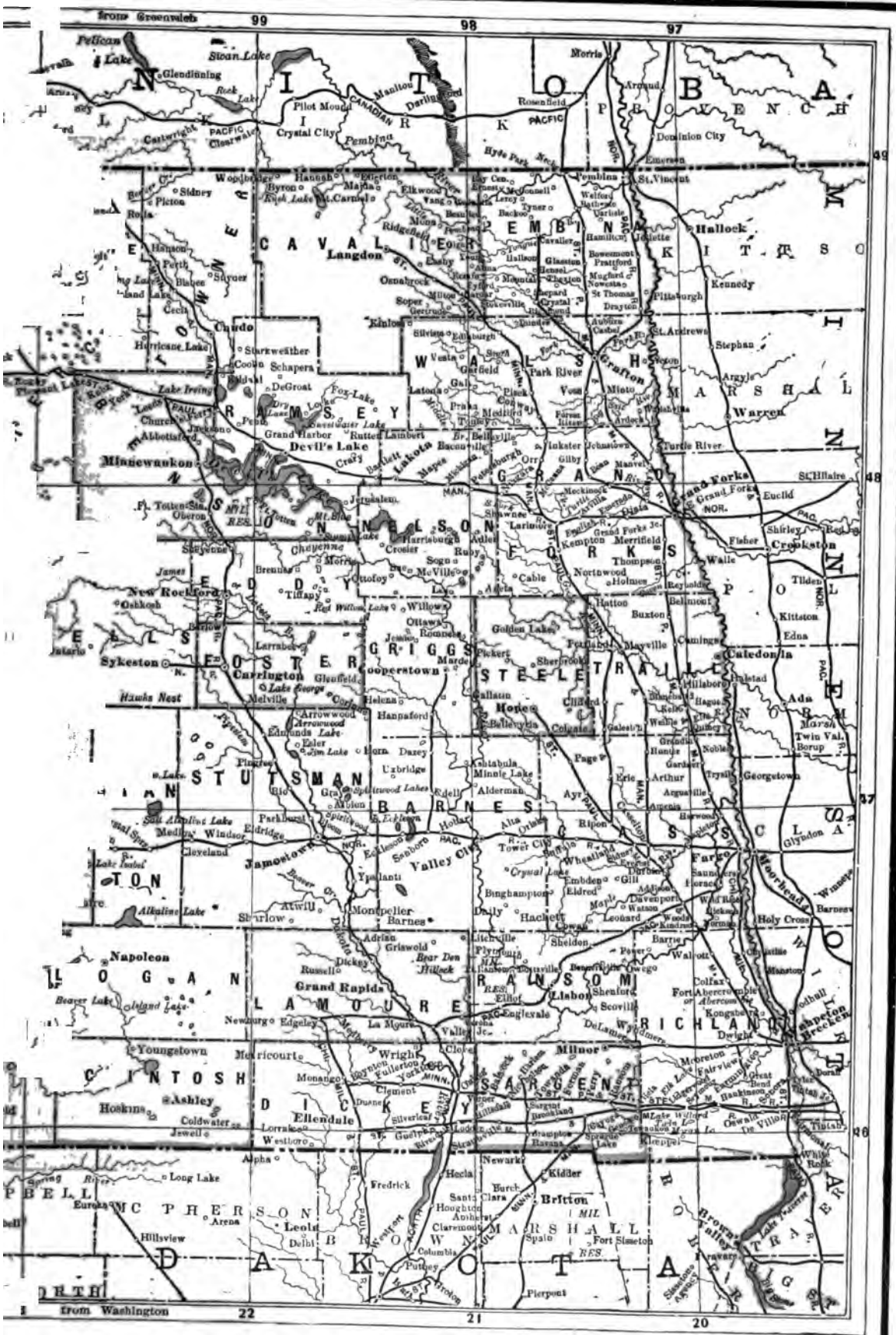
With the end of the war the demand for sugared condensed milk fell off, and the manufacturers who had been stimulated to too great a production turned their attention to this "Plain Condensed Milk." In Mr. Borden's early experiments the nature and cause of a peculiarly bad behavior of milk were imperfectly understood. Under certain circumstances and conditions the milk could be readily handled and gave no trouble in its manipulation. Sometimes these conditions would continue for days and for weeks, but there was no reliability on their continuing for a specified time, or indeed in different localities during the same time. The fault at first was supposed to originate in some want of cleanliness either at the factory or among those who produced and delivered the milk. This was a part, but not the whole cause.

The importance of cleanliness and of what seemed to many to be "an absurd, fastidious neatness," became apparent to Mr. Borden at an early stage of his investigation. He therefore instituted a set of rules for the government of dairymen in the care and management of milk; and as he bought only such milk as would pass the closest scrutiny of an expert, he was able after a time to enforce an observance of his printed regulations among dairymen. He adopted also the practice of cleaning and steaming his patrons' delivery cans at the factory, because he found, and with good reason, that this work might not be properly done at the farm.

It may be observed here that good condensed milk is without doubt more reliably clean and healthy than most milk that goes to city consumers. Dirty milk—milk foul with the drippings of the stable—cannot be condensed into a clean flavored product. The success of the condensing factory depends entirely upon the ability to put a fine flavored, perfect article on the market; the milk must be uniformly good. Milk is condensed in vacuum pans, the peculiar arrangement of the steam-pipes being the invention of Mr. Borden. He believed in doing the work rapidly, for the sooner you can get the milk from the cow into a condensed form the better. He therefore preferred to use two boilers of 55 horse-power each for supplying steam to the pans at his factory at Brewster. The average pressure of steam in the pipes at the pan is from 50 to 60 pounds to the square inch. The evaporation goes on best in clear, dry weather. In damp, foggy weather it takes a little longer to condense the milk. A 6-foot vacuum pan with two coils of pipe has the capacity of condensing about 2000 quarts per hour.

The milk as it is received goes into two square-like boxes or vats, the receiving-room being 4 or 5 feet higher than the bath- and heating-room. The bath-tubs are circular, and have a coil of steam-pipe at the bottom. The bath-tubs are filled within 6 or 8 inches of the top with water. The heating-wells are of copper, egg-shaped, and stand opposite the bath-tubs, a raised platform running between the two. The milk is drawn through a hose from the receiving tanks into copper cans sitting in the bath-tubs, each one holding about 40 quarts. Here the milk is heated to from 150° to 175°. It then goes to the heating-wells, which have a jacketed bottom for steam, and in them is heated up to the boiling point. It is then immediately drawn to the vacuum pan by atmospheric pressure produced by the air-pumps. A stream of milk is kept flowing into the pan about as fast as the evaporation goes on, or at the rate of 2000 quarts per hour; when the sugared milk is to be made, the amount of sugar is calculated for the given quantity of milk, and then turned into a movable tank or well, and here hot milk is poured upon it until it is thoroughly dissolved. The hot sugared milk is drawn up last in the vacuum pan and mingled with the milk which has been partially condensed. The sugared milk must be deprived of more water than the plain condensed milk, since the addition of sugar partially liquefies the mass—a curious fact. Plain condensed milk is reduced from 4 to 1; that is to say 75 per cent. of water is eliminated. It is treated in the pan precisely like sugared milk, except

104
103
102
101
Longitud
NORTHWEST TERRITORY
SOURIS RIVER
COAL DISTRICT
Alameda
Carnduff
Antler
Bottineau
Hill of the Maidenea Scout
Souris River
Melita
Sourisford
Lenore
49
MOUNTRAILLE
RENVILLE
BOTTINEAU
BURKE
DIVIDE
WILLIAMS
Sand Butte Lake
Muddy River
Muddy Creek
Wheelock
Ray
Tioga
White Earth
Manitou
Ross
MINK
Stanley
Elton
Wallace
Burlington
Granville
Minot
Norwich
Sandy Creek
Red Bank Creek
Avoca
PAUL Spring Brook
Williston
Nesson
Tenton
MISSOURI
Little Knife River
St Carro
Logan
Ecbo
Monse River
48
Fort Buford
Lake
RESERVE
ALLRED
WALLACE
STEVENS
Yellowstone River
Glen Charlotte Ore.
White Buttes
Little Missouri River
MCKENZIE
GARFIELD RIVER
Fort Berthold
FT. STEVENSON MIL. RES.
Coal Harbor
Krem
MERCER
Weller
Causey
Stanton
Hazen
Slaton
Deapolis
Washburn
Sanger
Fairview
Brentsauda Butte
Bells Lake
Bells Lake Creek
Knife River
OLIVER
Hannover
Painted Woods
Klein
Harmon
Congress
47
Cantonelle Hump
Sentinel Butte
Medora
Sully Spgs.
Fryburgh
Belfield
Dickinson
Gladstone
Taylor
Richardton
Little Missouri R.
Scoria
PACIFIC
South Heart R.
The Makoroff
Antelope
Hallstone Butte
Eagle Nest Creek
Mandan
BISMARCK
Sentinel Butte
STARK
Big Heart River
Carlew
Blue Grass
Sweet Briar
Antelope
Ft. Abraham Lincoln
MIT-RES.
Little Heart Butte
MORTON
New England City
Heart Butte
Red Butte
North Fork Cannon Ball River
Pretty Butte
Pretty Butte Cr.
Rainy Butte
White Butte
Dogs Teeth
Deep Tooth Cr.
Cannon Ball River
OLD FT. RICE & ABANDONED MIL RES.
Whetstone Butte
HETTINGER
Whetstone Creek or South Fork
Buffalo Cr.
Short
Medicine Pole
BOWMAN
Double Butte
Cannon Ball River
Beaver Cr.
Little Missouri
Battle Cr.
46
BOREMAN
N. Fork Wolf Butte Creek
Wolf Butte
Grand River
WAGNER
SOUTH
NORTH DAKOTA
SCALE OF MILES
0 5 10 20 30 40 50
27
26
25
24
Longitud


from Greenwich
99
98
97
Pelican Lake
Swan Lake
Glendinning
Rock Lake
Pilot Mound
Crystal City
Pembina
Manitou
Darlingford
CANADIAN
PACIFIC
Morris
Rosenfield
Arnaud
Dominion City
Emerson
Hyde Park Junc.
NOR.
St. Vincent
Hallock
Kennedy
Pittsburgh
Sidney
Picton
Byron
Hannah
Manfred
Elgerton
Elkwood
Mountain
Pembina
Walhalla
Cavalier
Langdon
Hamilton
Jessette
Bowesmont
Pratford
Mayfield
Newstead
Glasston
Hensel
Thingvalla
Mountain
Crystal Springs
Shepard
Crystal Springs Junc.
Hoskenville
Drayton
St. Thomas
Aubrey
Castle
Edinburgh
Kinloss
Silverton
Dundee
Park River
Grafton
St. Andrews
Stephan
Argyle
Warren
Minto
Ardoch
Turtle River
Chadd
Hurricane Lake
Starkweather
Coulee
Schapers
Devil's Lake
Minnewaukon
Lake Irving
DeGroat
Fox Lake
Grand Harbor
Rutter
Lambert
Bacon
Belleville
Lakota
Mapes
Melrose
Orr
Gilby
Manvel
Grand Forks
Euclid
St. Hilaire
Jerusalem
Mt. Blue
Shawnee
Larimore
Englevale
Harriesburg
Crosier
Ruby
Sogn
McVille
Cable
Northwood
Thompson
Reynolds
Holmes
Walle
Fisher
Crookston
Tilden
Kittston
Edna
Caledonia
Hillsboro
Halstad
Ada
Twin Valley
Borup
Georgetown
Arthur
Argusville
Amenia
Harwood
Leonard
Wyndmere
Lidgerwood
Forman
Lisbon
Fort Abercrombie
Abercrombie
Colfax
Kongsberg
Dwight
Mooreton
Fairview
Great Bend
Hankinson
Wahpeton
Breckenridge
Oberon
Sweetwater Lake
Cheyenne
Morris
Otsego
Tiffany
Red Willow Lake
Willow
Ottawa
Romness
Golden Lake
Buxton
Hatton
Belmont
Kittston
Edna
Sykeston
Carrington
Glenfield
Lake George
Melville
Cooperstown
Pickert
Sherbrooke
Fessenden
Maryville
Camrose
Hawks Nest
Helena
Gallatin
Hope
Chaffee
Bellevyda
Colgate
Galesburg
Wells
Ellendale
Grandin
Hunter
Noble
Gardner
Page
Erie
Mapleton
Horace
West Fargo
Fargo
Moorhead
Glyndon
Winona
Barnes
Holy Cross
Jamestown
Valley City
Tower City
Sanborn
Ypsilanti
Crystal Lake
Embden
Gill
Eldred
Binghampton
Davenport
Watson
Hachett
Daily
Montpelier
Barnes
Alkaline Lake
Sharlow
Atwill
Alta
Ripon
Wheatland
Sheyenne
Durbin
Saunders
Horace
Wild Rice
Dickey
Lake Ibsted
Medina
Windsor
Cleveland
Eldridge
Parkhurst
Spiritwood Lakes
Spiritwood
Edmunds Lake
Eckelson
Seaforth
Alfred
Orisko
Sutton
Litchville
Griswold
Bear Den Hillock
Plymouth
Sheldon
Barrie
Walcott
Chaffee
Wyndmere
Napoleon
Grand Rapids
Lamoure
Russell
Dickey
Oakes
Lisbon
Enderlin
Shenford
Scovill
Englevale
Newburg
Edgeley
La Moure
Valley Jct.
Dwight
Youngtown
Merricourt
Wright
Fullerton
Monango
Clement
Milnor
Sargent
Brampton
Barnes
Sprague Lake
Ashley
Hoskins
Coldwater
Jewell
Ellendale
Dickey
Lorraine
Westboro
Alpha
Long Lake
Eureka
Arena
Leola
Hillsview
Delft
Fredrick
Newark
Hecla
Kidder
Britton
Santa Clara
Houghton
Amherst
Claremont
Columbus
Putney
Spain
Fort Simcoe
Pierpont
Stratford
Waverly
Rockham
Stevens Agency
Browns Valley
Lake Traverse
Big Stone Lake
Whetstone R.
White Rock
Pelican Lake
Lake Traverse
Traverse
Wilkin
Otter Tail
Grant
Stevens
Big Stone
Swift
Kandiyohi
Pope
Douglas
Todd
Wadena
Becker
Mahnomen
Clay
Norman
Polk
Red Lake
Pennington
Marshall
Kittson
Roseau
Lake of the Woods
Beltrami
Hubbard
Cass
Clearwater
Wilkin
Otter Tail
Grant
Stevens
Big Stone
Swift
Kandiyohi
Pope
Douglas
Todd
Wadena
Becker
Mahnomen
Clay
Norman
Polk
Red Lake
Pennington
Marshall
Kittson
Roseau
Lake of the Woods
Beltrami
Hubbard
Cass
Clearwater
from Washington
22
21
20

near the close of the operation when the vacuum in the pan is broken and the mass is superheated or raised to a temperature of 190° to 200°.

The superheating process was discovered in 1862, and this was one reason that gave the Borden brands superiority in the market. The superheating not only helps the keeping qualities but prevents granulation.

The heat in the vacuum pan throughout the whole of the Borden process, apart from superheating, is kept at a temperature of from 135° to 145° Fahr. The filling of the one-pound cans with milk is done by machinery, and two women will fill 10,000 one-pound cans in ten hours.

The Census Report of 1880 gives the following statistics of condensed-milk factories for 1879:

State.	Condensed milk. Pounds produced.	Value of materials.	Value of product.
Connecticut	453,156	$24,923	$28,867
Illinois	3,645,408	260,834	447,741
Massachusetts	108,371	10,990	18,589
New York	8,826,332	731,111	1,052,391
Total	13,033,267	$1,026,858	$1,547,588

There are condensing factories in New York, Connecticut, Massachusetts, Pennsylvania, Maryland, and Illinois. The Borden patents have now expired, and the right to manufacture is free to all.

The total annual product of condensed milk in the United States is estimated between 15,000,000 and 20,000,000 pounds, and the exports during the past six or eight years have ranged in value from $118,000 to $180,000 a year.

Various milk-condensing factories have been established in Switzerland; in England, and in other parts of Europe. They are all operated on the Borden method. Other plans have been tried, such as heating the milk in open pans, and conveying off the moisture as it rises, by means of a system of fans driven by machinery, but such processes have been inferior to the Borden method, and have not proved satisfactory.

Dairy Boards of Trade.—Very great progress has been made of late in the manner of marketing dairy produce in the interior. Formerly dairy goods were bought from the shelves of the manufactory or dairy-house, on personal inspection and selection by the buyer. This plan kept a large force of merchants and their agents moving over the country at heavy expense, which, of course, must come from the goods purchased. Great advantage was often taken of the producer, who, unacquainted with the situation, sold his goods below market rates. Dealers, too, often found it difficult to fill orders promptly, on account of the time employed in getting the right kind of supplies together.

The necessity of an organized system of marketing dairy products had been long felt in the leading dairy districts of New York, especially at Little Falls, where large quantities of these goods are shipped from week to week. The first "Dairy Board of Trade" in the United States was inaugurated at Little Falls in 1870–71. Here shippers, dealers, factorymen, farmers, dairymen, and others interested in dairy produce meet together every Monday through the season for the transaction of business in dairy goods. The sales of cheese alone have aggregated 30,000,000 pounds per year.

The dairy board of trade system thus inaugurated soon began to attract attention, and the plan was copied, and boards were opened at other central dairy points, such as Utica, N. Y., E a, Ill., etc. They have spread rapidly over several States and in Canada, and now every leading dairy centre has its sale-days and boards of trade, where goods can be bought from week to week as they become ready for market.

Many claim that no such movement for the education of the producer in the laws of trade has been inaugurated during the present century, and that no class has become more intelligent in all that concerns the markets of the world for their produce than the dairymen of America, who have been accustomed to meet weekly for business at their respective dairy boards of trade. (X. A. W.)

DAISY, Ox-eye Daisy, White-weed, and also in England Moon-Daisy. This is *Chrysanthemum Leucanthemum* of Linnæus, or *Leucanthemum vulgare* of most American botanists. Though little related to the daisy of English poetry, these are the only "daisies" recognized in the United States, in the eastern portion of which they abound. They are merely naturalized from Europe, but their introduction to the United States must have been a long while ago. They were abundant in Pennsylvania at the time of the Revolution, and Shecut, who in 1806 published a Flora of Charleston, notes them as being then in South Carolina.

See Vol. VI. p. 681 Am. ed. (p. 773 Edin. ed.).

Sometimes the plant covers tracts of land acres in extent, presenting at a distance the appearance of fields of snow. It is, however, only in old pastures or partially waste ground that it is found in this abundance, and so can scarcely be called a very bad weed in American agriculture. These old pastures need breaking up and improving, and a year in corn, potatoes, or other hoed crops entirely destroys the ox-eye daisy. It is of no known use in the arts. Cattle will not eat it. Contraine says in the eighth volume of the *Proceedings of the Royal Academy of Brussels* that the powder will kill fleas, but pyrethrum powder will probably do this work better. It is also said to have been of some special use in certain hæmorrhages. Botanically, it is very near *Chrysanthemum*. The achenium or "seed" is terete, while in *Chrysanthemum* it is three-cornered or has three wings. (T. M.)

DAKOTA. The vast region long known by this name lies between 42° 28′ and 49° N. lat. and 19° 20′ and 27° W. long. from Washington. When it was organized as a Territory in 1861, it had an area of 147,700 square miles, and was surpassed in size by but two divisions of the United States, Texas and California. In 1889 this Territory was divided into two States, of nearly equal area, which have been admitted into the Union as North Dakota and South Dakota. The present article gives a general description of the States.

See Vol. VI. p. 581 Am. ed. (p. 773 Edin. ed.).

Surface.—Dakota, as a whole, is a vast rolling prairie of fertile land, and its wonderful productiveness, strange contradictions of supposed natural laws, in weather, climate, etc., have given to it the name of Wonderland. All of Dakota east of the Missouri River is a gentle, rolling prairie, with an occasional small and abrupt rise or coteau. The country west of the river is more broken. After riding over the Northern Pacific road 130 miles west of the Missouri the *Bad Lands* (*q. v.*) are reached. These strange formations, with their abrupt beginning and termination on either side, their barren appearance, and unproductive crisped soil, their pointed coteaus, precipitous sink-holes, and monotonous, weird appearance, inspire wonder and awe in the beholder. Though repulsive, as their name suggests, it has been proven that cattle can

be raised on parts of them very successfully, the grazing in some places being excellent.

In the south-western portion of the Territory are the Black Hills. Here the country assumes a mountainous surface, the high hills being covered with valuable pine, while they contain some of the richest mines on the continent.

History.—The territory now comprised in Dakota was known in 1845 as the Mandan region, from the Mandan Indians, who were for a long period the undisputed owners of the soil. These Indians ranked among the most intelligent of the American tribes, and many marks of their genius and thrift still remain in mounds and fortifications throughout the Missouri slope. But the hostile Sioux, or Dakotas, soon gained possession by conquest, and the vast tract became known as Dakota. The first cession of land within Dakota to the whites was made in 1858 by treaty with a faction of the Dakota tribe called Jancton, or Yankton, and also with the Poncas, a band of another nation, who claimed a portion of the country ceded. By this treaty 25,000 square miles in the south-eastern corner of the Territory were thrown open to settlement; but only a few bold hunters, prospectors, and adventurers dared venture into the newly acquired possessions, which the aborigines were slow to abandon. Subsequent and successive treaties with the Sioux or Dakotas extended this purchase until now nearly all that portion east of the Missouri River has been acquired by the government, and is open to the settler. In February, 1877, a treaty was effected, which ceded to the government the valuable mineral region of the Black Hills, in south-western Dakota. Permanent white settlement did not begin until 1859, and the Territory was not organized by act of Congress until March 2, 1861, at the close of Buchanan's administration. The necessary executive and judicial officers were immediately appointed by President Lincoln, and by June, 1861, Dakota was an organized and well-defined Territory, with the following list of officers administering her affairs: Governor, William Jayne, of Illinois; Secretary, John Hutchinson, of Minnesota · Chief-Justice, Philemon Bliss, of Ohio.

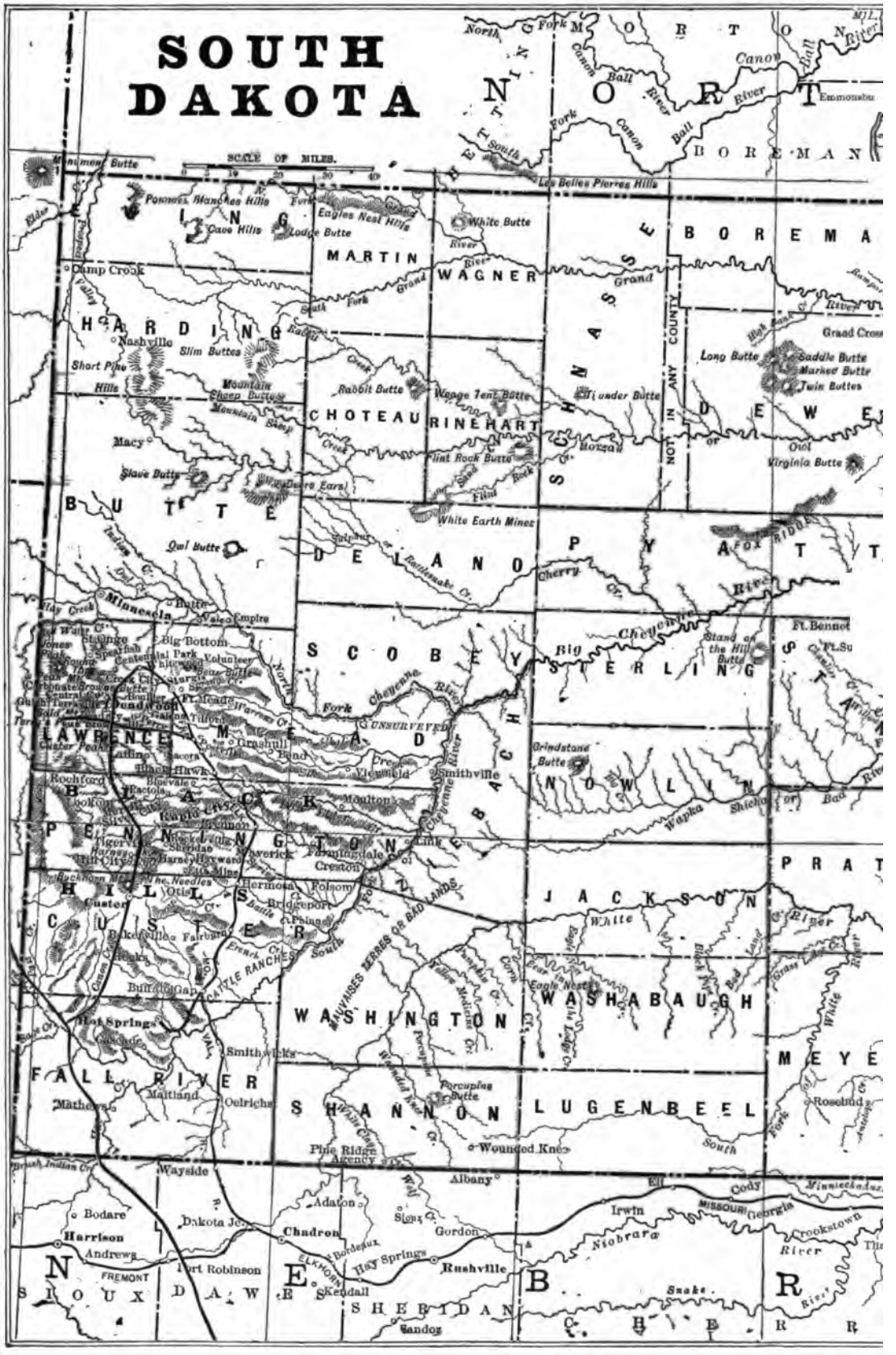
The original boundaries as defined by the act of March 2, 1861, included, in addition to the present area of the Territory, all the region now embraced in Idaho, Montana, and Wyoming, these Territories having been created by subsequent acts of Congress. The first proclamation of Gov. Jayne was issued July 13, 1861, dividing the Territory into judicial districts, and assigning the judges thereto. By a second proclamation (July 29) the Territory was divided into legislative districts, and Sept. 16, 1861, designated as the day for a general election to choose a delegate in Congress, members of the legislature and county officers.

The first meeting of the legislature was at Yankton, March 17, 1862, and a session of 60 days was held, during which the capital was located at Yankton, a code was enacted, and an adjournment taken on May 15, 1862. During this time the Southern rebellion was raging, and in the winter of 1861–2 the secretary of war authorized the enlistment of Company A, Dakota Cavalry, which organization was mustered into the United States service April 19, 1862, with 96 men under Capt. Nelson Miner. The following winter Company B, Dakota Cavalry, consisting of 88 men, with William Tripp as captain, was also mustered into the service.

The second general election was held Sept. 1, 1862, the candidates for delegate to Congress being Gov. William Jayne and Gen. Todd. The latter contested the election before the United States House of Representatives, and was awarded the seat. Now was the most discouraging and trying period to the settlers of Dakota. In August, 1862, the news of the outbreak of the Sioux in Minnesota was heralded throughout the land, and this, together with the report that the Indians were moving westward, struck terror to the hearts of the settlers. But in answer to the proclamation of the governor, calling into armed service all citizens subject to military duty, over 400 loyal citizens responded, and hastily formed themselves into military companies, furnishing their own arms, subsistence, and clothing. Towns were fortified, women and children were sent to neighboring States, or found refuge in the stockades at the villages. In June, 1863, the government despatched Gen. Alfred Sully with 2000 mounted troops to the Territory. He hotly pursued the Indians, and routed them at the battle of White Stone Hills. Then returning he garrisoned the frontier settlements for the winter, and Fort Sully was built. It was during the same season that the Santee and Winnebago tribes of Indians were located on reservations in Dakota. But the Indian troubles were not all that harassed the settlers, for in the summer of 1864 drouth and grasshoppers robbed them of all results of their labors, and left the fields totally bare. The war with the Indians closed in the spring of 1865, after three years of terror and uncertainty, and treaties of peace and friendship were signed.

A census taken in 1861 showed the population of the Territory to be 1786. In 1870 the census showed a population of 14,181, of whom 12,887 were whites. The population gradually increased until 1875, when the successive good crops had fairly advertised the country, and the Dakota boom was inaugurated. At this time gold was discovered in the Black Hills, and speculators and adventurers flocked in from all parts of the country. While passing through the Territory *en route* to the hills, many became impressed with the fine agricultural country, and gave up the mining craze to secure farming lands—most of this class stopping east of the Missouri River. Thousands more were attracted by the stories of the golden wheat-fields to that portion of the Territory lying north of the 46th parallel (which includes nearly the whole of the present State of North Dakota), which then did not have a thousand souls within its borders. In 1890 the State had a population of 182,719, while the population of South Dakota reached 328,808. The assessed valuation of property has also greatly increased, and is now over $150,000,000.

Climate.—Dakota has the same variations of climate as other portions of the North-west. The air is pure, dry, and invigorating, and on this account, even when the thermometer denotes 25 and 30° below zero occasionally during the winter months, less inconvenience is felt than in the Eastern States at a temperature 20° higher. In spring and summer abundant rain and heat insures the rapid growth of vegetation, and crops always mature and are harvested before frosts appear. About three-fourths of the annual rainfall comes in the spring and early summer. During the latter part of summer and all of the fall the rainfall is light, and the weather is delightful, giving bright, warm days and cool nights. The winters are usually open, though occasionally fierce, blinding snow-storms, called


SOUTH DAKOTA
SCALE OF MILES.
0 10 20 30 40
Monument Butte
Ponnos Mandan Hills
Cave Hills
Eagles Nest Hills
Lodge Butte
White Butte
Les Belles Pierres Hills
Camp Creek
Nashville
Slim Buttes
Short Pine Hills
Mountain Sheep Butte
Rabbit Butte
Wagon Tent Butte
Flint Rock Butte
Macy
Slave Butte
Deers Ears
White Earth Mines
Qual Butte
Minnesela
Butte
Vale
Empire
Big Bottom
Volunteer
Ft. Meade
Deadwood
Crow Creek
Rochford
Rapid City
Tigerville
Sheridan
Hermosa
Folsom
Custer
Bridgeport
Pringle
Buffalo Gap
Hot Springs
Smithwick
Fall River
Maitland
Oelrichs
Mathews
Pine Ridge Agency
Wounded Knee
Wayside
Albany
Adaton
Bodare
Dakota Jct.
Chadron
Gordon
Harrison
Andrews
Bordeaux
Hay Springs
Rushville
Fort Robinson
Kendall
Sandoz
Irwin
Missouri
Georgia
Crookston
Niobrara River
Snake River
Cody
Rosebud
Smithville
Moulton
Creston
Farmingdale
Maverick
Grindstone Butte
Stand of the Hill Butte
Ft. Bennett
Ft. Su
Virginia Butte
Long Butte
Saddle Butte
Twin Buttes
Grand Cross
Oriel
Horsan
Cherry Creek
Cheyenne River
Big Cheyenne
Wapka
Shicka
Bad River
White River
Grass Land
Porcupine Butte
Porcupine Creek
Wounded Knee Creek
Eagle Nest Creek
Corn Creek
Medicine Creek
Bad Land
Rattlesnake Creek
Indian Creek
Elk Creek
Spring Creek
Rabbit Creek
Grand River
South Fork
North Fork
Ball River
Canon Ball River
Elbow Woods
Timber Lake
Mott
Emmonsburg
Boreman
Meyer
Lugenbeel
Shannon
Washington
Washabaugh
Jackson
Pennington
Lawrence
Butte
Harding
Perkins
Meade
Corson
Dewey
Ziebach
Stanley
Sterling
Scobey
Delano
Choteau
Martin
Wagner
Gregory
Tripp
Todd
Mellette
Bennett
Fall River
Custer
Fremont
Sioux
Dawes
Sheridan
Cherry
Keya Paha
Boyd
Brown
Rock
Holt
Antelope
Knox
Cedar
Dixon
Dakota
Thurston
Wayne
Pierce
Madison
Stanton
Cuming
Burt
Washington
Douglas
Sarpy
Cass
Otoe
Nemaha
Richardson
Pawnee
Johnson
Gage
Jefferson
Saline
Thayer
Nuckolls
Webster
Clay
Fillmore
York
Polk
Butler
Saunders
Lancaster
Seward
Hamilton
Merrick
Howard
Greeley
Valley
Sherman
Buffalo
Kearney
Phelps
Gosper
Furnas
Harlan
Franklin
Webster
Adams
Clay
Fillmore
Nance
Boone
Platte
Colfax
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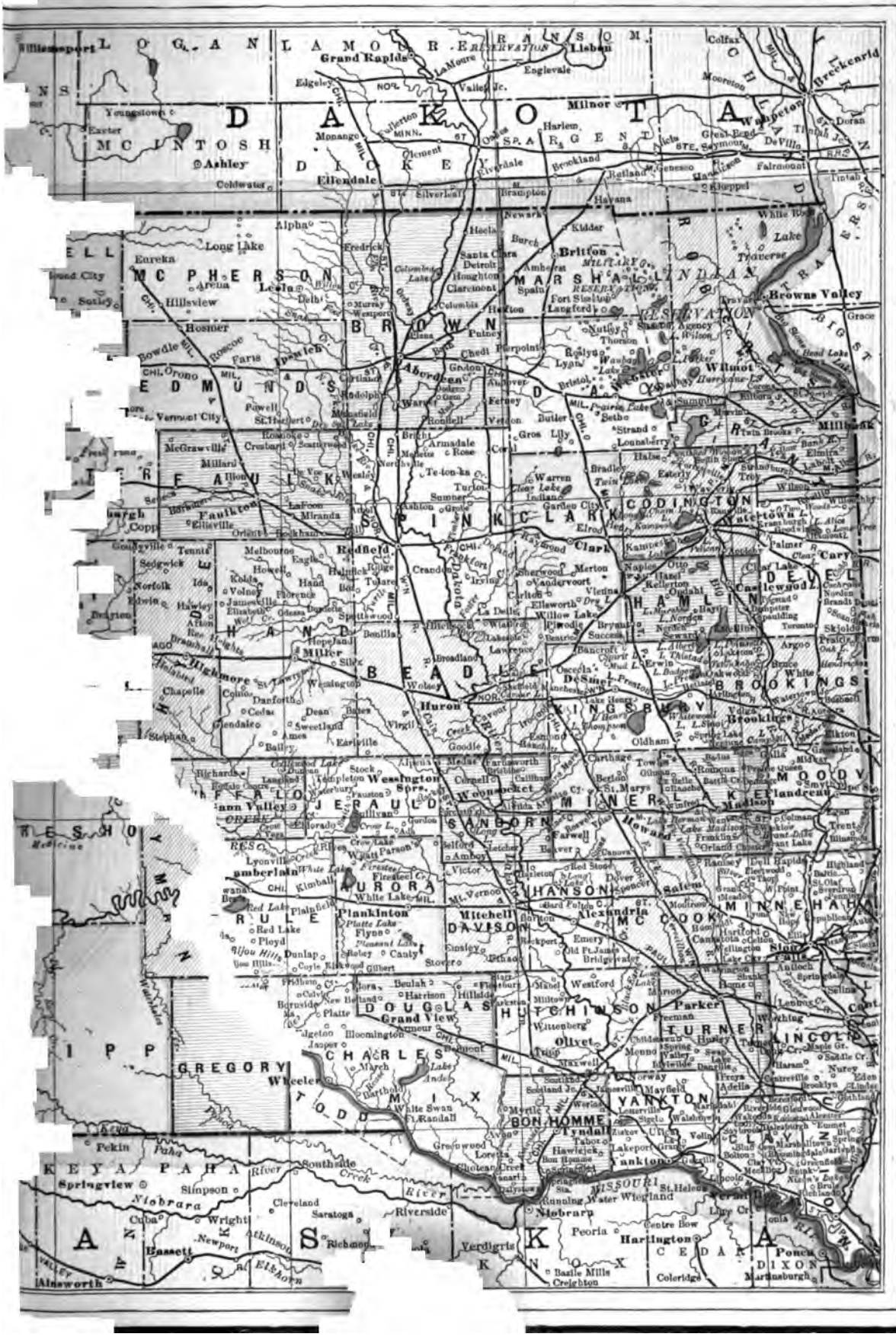
DAKOTA
LAMOURE
DICKEY
MCINTOSH
MCPHERSON
EDMUNDS
FAULK
SPINK
CLARK
BROWN
MARSHALL
ROBERTS
GRANT
CODINGTON
HAMLIN
DEUEL
BROOKINGS
KINGSBURY
BEADLE
HAND
HYDE
HUGHES
SULLY
HUGHES
STANLEY
JONES
LYMAN
BUFFALO
JERAULD
SANDBORN
MINER
LAKE
MOODY
MINNEHAHA
AURORA
HANSON
DAVISON
MITCHELL
MCCOOK
RUSK
DOUGLAS
HUTCHINSON
TURNER
LINCOLN
CHARLES
GREGORY
TODD
MIX
YANKTON
BON HOMME
CLAY
UNION
KEYA PAHA
BOYD
KNOX
CEDAR
DIXON
DAKOTA
ANTELOPE
WHEELER
Aberdeen
Britton
Milbank
Watertown
Brookings
Huron
Redfield
Miller
Highmore
Wessington Springs
Mitchell
Plankinton
Parkston
Alexandria
Sioux Falls
Grand View
Wheeler
Springview
Niobrara
Verdigris
Harlington
Ponca
Ainsworth
Bassett
Valentine
Grand Rapids
Ellendale
Ashley
Leola
Hosmer
Faulkton
Gettysburg
Onida
Pierre
Fort Pierre
Chamberlain
Winner
Gregory
Burke
Colome
Lake Andes
Wagner
Tyndall
Scotland
Yankton
Vermillion
Elk Point
Jefferson
Beresford
Canton
Lennox
Hartford
Sioux Falls
Flandreau
Madison
Howard
Salem
Canistota
Freeman
Marion
Parker
Tabor
Lesterville
Volin
Irene
Wakonda
Clay Center
Centerville
Meckling
Bloomfield
Crofton
Niobrara
Verdigris
Peoria
Centre Bow
Lucy Cr.
Coleridge
Creighton
Basile
Mills
Randall
Water
Wiegland
Missouri
St. Helena
Ponca
Dixon
Martinsburg
Cleveland
Saratoga
Riverside
Wright
Cuba
Simpson
Springview
Keya Paha
Southside
Creek
Niobrara
River
Elkhorn
Newport
Atkinson
Richmond
Verdigris
Creighton
Basile
Mills
Randall
Water
Wiegland
Missouri
St. Helena
Ponca
Dixon
Martinsburg
Cleveland
Saratoga
Riverside
Wright
Cuba
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River
Elkhorn
Newport
Atkinson
Richmond
Verdigris
Creighton
Basile
Mills
Randall
Water
Wiegland
Missouri
St. Helena
Ponca
Dixon
Martinsburg

"blizzards," last for days, and cause much suffering to those exposed to them.

Resources.—This vast domain extends through more than six degrees of latitude. The latitude of its northern wheat-belt is the same as that of Paris. The soil is a mellow rich black loam, with clay sub-soil, varying somewhat in the different portions of the Territory. In the Red River valley the soil is heavy, extremely rich, and very deep, which fact, together with the uninterrupted level surface of the country, causes "late springs" for farmers, but as a rule the crops are good. The James and Missouri River valleys are gently rolling, and the soil has a slight sprinkling of sand, and hence is much dryer than that of the Red River valley. In central and southern Dakota the surface is undulating, with a deep soil tending to a sandy loam. There is a large percentage of silex in all localities, and an abundance of lime, as the sub-soil has been formed partly from the decomposition of soft limestone. Gypsum crystals also abound in the deeper strata, and this fact will render the importation of fertilizing materials unnecessary. Owing to the lightness of the soil in the greater portion of the Territory, and the drying winds, trees and seeds must be planted deeply, but, once firmly rooted or started, plants cannot be affected by ordinary drouths or hot winds. The porous soil resists drouth with wonderful power, and readily absorbs moisture from the air, while the peculiar properties of the sub-soil account for the large yields on Dakota farms. The wheat raised in northern Dakota is known as "No 1 hard," and contains an unusually large amount of bread-producing material. Its cultivation is conducted on a scale of almost incredible magnitude, the fields ranging from 1000 to 20,000 acres, and the harvesting scenes on these farms, with their army of self-binding machines, furnish an inspiring sight. The yield is sometimes forty bushels of wheat per acre, although the average is not above twenty bushels. In central and southern Dakota there exists a very fine quality of grass, and in the sandy soil corn has been successfully raised. In the Upper Missouri valley, and even in the Bad Lands, are fine cattle-ranches, and already large herds of cattle are grazing in these valleys.

In the Black Hills every variety of mineral is to be found. Gold, silver, copper, tin, coal, salt, mica, gypsum, and other valuable minerals abound in immense quantities. Petroleum also exists in large veins and oil-springs, and is now being used for lubricating purposes. There are also extensive pine forests and hard-wood groves among the hills, rendering this isolated region richer in natural wealth than any other section of the Territory. Efforts are being made to secure the construction of a road from some point on the Northern Pacific west of the Missouri into the mineral districts at an early day. Along the banks of the various streams which flow through the Territory are small belts of timber consisting principally of cottonwood, elm, willow, box-elder, and very little oak; yet, on the whole, Dakota is destitute of timber. The press of the Territory has directed special attention to this need, and in the older-settled regions timber-culture is somewhat advanced. The question of fuel was for many years a formidable one to the settler, but the discovery of extensive veins of bituminous coal or lignite has removed a serious obstacle to the prosperity of the country. On the line of the Northern Pacific road, and in the counties of the Upper Missouri valley, veins of lignite, ranging from four to fifteen feet in depth, have been opened.

Rivers.—The largest river in the Territory (as well as on the continent, when considered from its source to its mouth) is the Missouri. This mighty stream runs diagonally through the Territory, and is navigable as far north as Fort Benton, Montana, 1200 miles west of Bismarck on the Northern Pacific crossing. A steamboat could take a cargo at Pittsburg, Pa., or New Orleans, and discharge it at the foot of the Rocky Mountains, after having made, on the winding rivers, a voyage of nearly six thousand miles—the longest river voyage possible to make in the world. The Missouri is a rapid, turbid stream, receiving its main supply of water from the melting snow and rapid streams of the Rocky Mountains. Its channel is very uncertain, continually changing and giving trouble to the navigator. Its tributaries are numerous, and form an important part of the country's irrigation. The Yellowstone, which enters Dakota in the extreme north-west, and becomes a part of the Missouri, is the largest tributary and the only one navigable. The Knife River, a small stream, is next in order. The Dakota, or James River, rises in the northern part of the Territory, and flows 600 miles south, joining the Missouri a few miles north of Yankton in the south-eastern corner of Dakota. The valley of the James is a rich agricultural strip of land, and is being settled very rapidly. The Big Sioux River, rising in central Dakota, takes a southward course through the eastern portion of the Territory, and empties into the Missouri near Sioux City, Iowa; along this stream are several falls, which are utilized for milling purposes, the principal mill being at Sioux Falls. The Little Missouri on the west, Big Cheyenne on the east, White, Heart, Cannonball, Grand, and Moreau are also tributaries of the Missouri.

The Red River of the North is in central Minnesota, and flows north over 200 miles into Lake Winnipeg, Canada. It is a narrow, deep stream, and is navigable from Fargo to Winnipeg. It traverses a region noted for its fertility. Its tributaries are the Goose, Park, Tongue, Pembino, Cheyenne, Turtle, and Salt Rivers. The Souris or Mouse River flows into the Territory from the British possessions, and after running southward seventy-five miles returns to Canada and empties into the Red River.

Dakota has also deep and beautiful lakes. The largest of these bodies of water is Devil's Lake (probably so called on account of its salt water), in the northern portion of the Territory on the Manitoba Railroad. It is fifty miles long and fourteen miles wide, and is surrounded by a belt of timber. Among the other principal lakes are Traverse and Big Stone on the eastern boundary near the dividing line between north and south Dakota. In all these streams and lakes fish abound. Water is reached by wells at a remarkable depth, and at several points artesian wells with an inexhaustible supply are now flowing. The rain-fall has steadily increased with the settlement of the country and is now sufficient for all needs of vegetation.

Industries.—Dakota is, of course, an agricultural country, and the efforts of the settlers have thus far been put forth in the work of bringing out the wealth of the soil and raising cereals. But as the country develops and its remote regions are explored, the fact becomes apparent that diversified farming is the true basis upon which to work. The cattle interests are already assuming gigantic proportions, and herds of from 1000 to 40,000 are scattered throughout the north-western districts. Manufacturing has scarcely

begun. but there are already numerous flouring-mills in the principal towns, and with the building of railroads the internal commerce of the Territory is steadily increasing.

Railroads.—The Northern Pacific Railroad traverses northern Dakota from east to west, crossing the Missouri River at Bismarck over an iron bridge which cost $1,500,000. The Chicago and North-western and the Chicago, Milwaukee, and St. Paul roads each enter the Territory in the southern half, traverse it as far west as the Missouri River, and are now pointing toward Bismarck. The Rock Island road is also being built from Pipestone, Minnesota, in a northwesterly direction through the Territory to the Missouri River.

Government.—Dakota, as all Territories, is governed by the United States, the governor, secretary, chief-justice, associate justices of the supreme court, United States marshal, United States attorney, and surveyor-general, being appointed by the President and paid by the general government. The territorial treasurer, auditor, superintendent of public instruction, attorney-general, and officers of the penal, charitable, and educational institutions are appointed by the government.

The legislative power is vested in a legislative assembly of two branches. The council or senate has twelve members, and the house of representatives twenty-four. The members of the legislature are elected by the people and paid by the general government at the rate of $4 per day and mileage. All laws passed are subject to a revision by Congress. The sessions of the legislature are biennial and are limited to 60 days. The delegate to Congress is elected by the people, as are the county officers; but when a new county is organized the governor appoints three county commissioners, who have the power of appointing the remaining officers. The judicial districts are four in number, with the places of holding district court as follows: First, Deadwood; second, Yankton; third, Fargo. The supreme court meets at Bismarck, the capital, twice a year.

Territorial Institutions.—The legislative assembly in 1883 passed an act removing the seat of government from Yankton, and appointed nine commissioners to locate the same at some central and desirable point. The commissioners decided upon Bismarck, and now a capital building to cost, when completed, $500,000, is in process of construction. The public institutions of the Territory are all creditable, and are constructed on the most modern and improved plans. The hospital for the insane at Yankton, which when completed will cost over $100,000, has been in operation over a year, and will accommodate 200 patients. Another hospital for the insane is now being erected on the detached plan at Jamestown. The completed penitentiary at Sioux Falls cost $80,000, and another equally fine penitentiary building is in process of construction at Bismarck. A school for deaf mutes is in operation at Sioux Falls.

The educational interests of the Territory are fostered and encouraged in a most commendable manner. The Territory has provided for universities at Vermillion and Grand Forks; normal schools at Madison and Spearfish, and an agricultural college at Brookings. Every town and city in the Territory has a system of schools, and high school buildings, ranging in cost from $10,000 to $80,000, have been erected by the leading municipalities. In addition to these the different religious denominations are establishing universities and colleges throughout the domain. The common school system is thorough, improved, and in keeping with the advancement and progress of the country.

In the towns and growing cities of Dakota the society is refined and cultured, and all modern fashions and customs are represented. Entertainments, social gatherings, the latest operas and dramas are witnessed by intelligent audiences. The architecture of the commercial centres is in keeping with the improvements of the times. The richness of the country will in the future depend upon its exports, which are steadily increasing in proportion as its natural resources are developed. Among the chief articles of export are the minerals, one company alone shipping $4,000,000 in gold bricks yearly from the Black Hills. In a few years Dakota will furnish food for the millions of the East, and her entire available surface will be under cultivation.

The population of the Territory is composed mostly of Americans, although there are settlements of Scandinavians, Russians, Bohemians, and Poles scattered about. The majority of foreigners are from Scandinavia, but the major portion of the people are Americans. All the men are young, vigorous, energetic, and ambitious. Newspapers abound and form a marked feature of the civilization of this new country. Among the principal towns—or cities, as each has a mayor and board of aldermen—are Bismarck, the capital, Fargo, Sioux Falls, Jamestown, Grand Forks, Deadwood, Huron, Pierre, and Mitchell.

Dakota must soon be admitted into the Union as a State, as her population demands. The financial condition of the Territory is good, the only debt being a small one contracted in the erection of public buildings. There has been a clamor for division on the 46th parallel of N. lat. by many, but its accomplishment is looked upon as improbable at present. (J. M. Q.)

DAKOTA INDIANS, the name of a family of North American Indians, who speak languages of common origin, and are similar in general habits. Their location is between the Rocky Mountains and the Mississippi, reaching north into British America. They have a tradition that they came originally from the West, and were checked by the Algonkins on reaching the Mississippi. One tribe, however, pushed through to Lake Michigan, and formed the Winnebago tribe of that region. The Quapaws or Arkansas settled on the Ohio, whence they were driven south by the Illinois, to the region which now bears their name. The western tribes comprise the various bands of the Sioux or Dakotas proper—the Assiniboins, or Stone Sioux, the Omahas, Iowas, Kansas, Poncas, Ottoes, Osages, Missouris, and Crows, and perhaps also the Minetarees and the Mandans, though the affinities of the latter tribes are doubtful. The languages of the Dakotas are thought to approach the Mongolian more nearly than most other American languages.

The Dakotas are less fierce and warlike than the Eastern Indians. In form they are tall and vigorous, with high cheek bones and thin visages. They resided near the confluence of the Mississippi and the St. Peter's for more than two centuries. Here a little agriculture was practised, but the more western bands depended entirely upon the buffalo for subsistence. The Assiniboins separated from them two centuries ago, and are since known by them as *Hoka* or rebels. Dakota means "allied." All who are not allied are enemies, though of the same stock, and it was deemed

glorious to kill one of them. The Dakotas are more reserved and slower in their mental activities than the Southern Indians, but their memories are better, and their characters more robust. The Dakotas are divided into three grand sections—the Isamjati (Santees), formerly residing near the Mississippi; the Ihanktonwan (Yanktons), prairie tribes ranging from Lake Winnipeg to the Missouri; and the Titonwan (Tetons), who comprise many bands, and range mostly south-west of the Missouri. The total number is estimated at about 60,000 souls.

Like most of the Northern Indians they have a vague belief in a Great Spirit and in a future life, and numerous superstitions, but little than can be called worship. Great affection for their children is manifested by the women, but little respect is shown to the aged and infirm, who were often left on the prairie to perish, a little food being provided them. This was rather a result of the necessities of a nomad life than deliberate heartlessness. Some tribes inflict upon themselves severe self-tortures, as a part of their religious observances.

The former country of the Dakotas contained the famous pipestone quarry in Pipestone co., Minn., which was long a neutral ground, all Indians resorting to it for material for their pipes. It was considered sacrilegious to use this substance (catlinite) for any other purpose, and the Dakota workmen are very skillful in working it into pipes. Great skill is also displayed with the lasso and the bow in their buffalo hunts. The confederated Dakota tribes were called by the French and the Algonkins the Nadowosioux, whence the name Sioux. (See SIOUX.) (C. M.)

DALE, ROBERT WILLIAM, an English Congregational minister, was born in London, Dec. 1, 1829. He was educated at Spring Hill College, Birmingham, and graduated at the University of London in 1853. He took his degree of M. A. in philosophy and political economy, and won the gold medal in that department. In 1853 he became associate pastor with Rev. John Angell James in the Congregational church at Carr's Lane, Birmingham, and on the death of Mr. James, in the autumn of 1859, succeeded to the sole pastorate of the church. In 1868 he was made chairman of the Congregational Union of England and Wales. For several years he was editor of the *Congregationalist*, and in 1873 he delivered the Congregational Union lectures, taking for his subject the doctrine of the atonement. He has taken part in all the movements of the Congregational churches of England in recent years, and has also had a share in many public movements not of a strictly religious character. Among these were—the effort, under the leadership of Mr. John Bright, for the extension of the parliamentary franchise, which led to the Reform Act of 1867; the short but stormy agitation caused by the National Education League, which led to the Education Act of 1870; and the agitation for the disestablishment and disendowment of the Church of England. Since 1859 he has been chairman of the education board of Spring Hill College. He has also taken great interest in municipal and educational matters in Birmingham. In 1870 he was elected to a seat in the first school board, and when he retired in 1880 he was its vice-president. He was appointed by the senate of the University of London to represent it in the governing body of the School of King Edward VI., which chiefly provides higher education in Birmingham. Mr. Dale insists that if the will of God is to be done on earth as it is in heaven, Christians must take their full share in political and municipal life; and he has endeavored to enforce his precept by his example. In his theology he holds what are commonly understood as the evangelical doctrines, but rejects that of eternal suffering, believing that though man survives death, he has no enduring existence unless his life is voluntarily rooted in Christ; those who are not "in Christ" will therefore perish. In politics he is a Liberal of the more advanced type, and for many years was intimately associated with Mr. Joseph Chamberlain. Mr. Dale has travelled in the East, and in 1877 visited America at the invitation of the theological faculty of Yale College to deliver the Lyman-Beecher lectures on preaching. He received from that college the degree of D. D., but as he has scruples which prevent him from using the title of "reverend," he is also unable to avail himself of the other title. On his return to England he published in the *Nineteenth Century* his *Impressions of America*, and these, except the part relating to religion, have been republished in the United States in a popular form. He is the author of numerous other works, among which are the *Life of Rev. J. A. Adams; Discourses on the Epistle to the Hebrews* (1865; 5th ed. 1880); *Discourses on Special Occasions* (1866); *The Ten Commandments* (1871); *Week-Day Sermons* (1867); *The Ultimate Principle of Protestantism* (1874); *The Atonement* (1875; 8th ed. 1881); *Nine Lectures on Preaching* (1877); *The Evangelical Revival* (1880); *Lectures on the Epistle to the Ephesians* (1882). He has contributed frequently to the *British Quarterly*, *Nineteenth Century*, *Fortnightly Review*, *Contemporary Review*, *Good Words*, and the *Sunday Magazine*.

DALL, CAROLINE HEALY, an American author, born in Boston in 1824, and married in 1844 to the Rev. Charles Henry Apple Dall, a Unitarian minister. She early began her literary work, devoting much attention to the anti-slavery movement, in which she heartily engaged, and in later times to the questions of woman suffrage, and of employment for women. Among her works are *Essays and Sketches* (1848); *Bunsen's Egypt, a presentation* (1868); *Patty Gray's Journey* (1870); *The College, the Market, and the Court; Historical Pictures Retouched;* a *Life of Dr. Marie Zakrzewska;* and *Sunshine, Lectures on Health*.

DALLAS, a town of Texas, county-seat of Dallas co., is on the east bank of the Trinity River, 265 miles N. N. W. of Houston, at the intersection of the Texas and Pacific Railroad with the Houston and Texas Central Railroad. It is also a terminus of the Dallas and Wichita Railroad and the Texas Trunk Railroad, and is on the Chicago, Texas, and Mexican Central Railroad, now in construction, and on a branch of the Texas and St. Louis Narrow Gauge Railroad. It is thus an important railroad town, and the centre of trade of Northern Texas. It has a fine court-house of gray limestone, 1 national bank and 3 other banks, 16 churches, 2 colleges, and excellent public and private schools. There are 3 daily newspapers, 4 weekly newspapers, one of which is German, besides 4 religious papers and 2 monthly magazines. Its industrial works comprise 2 foundries and machine-shops, 3 flour-mills, 4 spice-mills, marble- and metal-works, wagon- and carriage-factories, and manufactories of soap, boots, shoes, harness, agricultural implements, barrels, pumps, etc. It has 2 cotton compresses, 2 grain-elevators, a telephone exchange, gas- and water-works. Its annual shipments of cotton exceed 70,000 bales, and of grain 500,000 bushels. Its exports, including live-stock, are valued at $4,000,000. It is situated on a bluff with good natural drainage, and the private as well as the public buildings are of brick and stone. It was settled

in 1844 by John N. Bryan, and is incorporated as a city. The surrounding country is remarkably fertile and raises large crops of grain, cotton, fruits, and vegetables. Population, 38,140.

DALLAS, ALEXANDER JAMES (1759–1817), an American statesman, was born June 21, 1759, in Jamaica, W. I., where his father, Robert Charles Dallas, a distinguished Scotch physician, had resided for several years. When his father returned to Scotland, Alexander was placed at school near London. In 1780 he married Arabella Maria, daughter of Major George Smith, and after the death of his father returned to Jamaica, where he remained till 1783, when he removed to Philadelphia. In 1785 he was admitted to the bar of Pennsylvania, practised in Philadelphia, contributed to several periodicals, and edited the *Columbian Magazine*. In 1790 he began to publish his *Reports of Cases in the Courts of the United States and of Pennsylvania before and since the Revolution*. In 1791, Gov. Mifflin appointed him secretary of the commonwealth of Pennsylvania, and while holding this position Mr. Dallas published an edition of *The Laws of Pennsylvania from 1700 to 1801*, with notes. On July 4, 1793, he took part in the formation of the Democratic Society of Pennsylvania. In 1795 he actively opposed the ratification of the treaty negotiated with England, and published a pamphlet on the *Features of Jay's Treaty*. About the same time, and for many years later, the violence of party spirit led to impeachments of judges and other officers, both State and national. In most of these trials Mr. Dallas took a prominent part, generally in defence of the accused, and by his arguments assisted in determining the fundamental principles of the newly-established system of government. In 1801 he was appointed by Gov. McKean recorder of Philadelphia, and also by President Jefferson United States attorney for the eastern district of Pennsylvania, and remained in this office till 1814, when he was appointed by President Madison Secretary of the Treasury. In 1811 the Senate had refused to renew the charter of the Bank of the United States, although Mr. Gallatin, then Secretary of the Treasury, had strongly urged its necessity. When he was driven from his post after the war with Great Britain had commenced, the Government soon became bankrupt and loans impracticable. Mr. Dallas, Mr. Gallatin's most intimate friend and the sharer of his financial views, was now called to the position, insisted upon having a national bank, and got it. The bank was chartered for twenty-one years with a capital of $35,000,000, and had twenty-five directors, five of whom were appointed by the Government. Mr. Dallas succeeded in calming the fears of those who dreaded the effects of a large issue of Treasury notes, and in a short time confidence was restored and the Government notes were taken at par. Similar success attended the new tariff which he prepared and presented to Congress. In March, 1815, he assumed in addition the duties of Secretary of War, and successfully performed the difficult task of reducing the army. In Oct., 1816, he resigned his office, and returned to Philadelphia to resume his profession. He died suddenly at Philadelphia, Jan. 16, 1817. Besides the works already mentioned, Mr. Dallas published several legal and political tracts and an *Exposition of the Causes and Character of the Late War*, 1815. In 1862 his son, Hon. Geo. M. Dallas, prepared for the press the *Life and Writings of A. J. Dallas*, which, however, was not published till 1871.

DALLAS, GEORGE MIFFLIN (1792–1864), an American statesman, second son of the preceding, was born at Philadelphia, July 10, 1792. He graduated at Princeton College in 1810, with the highest honors, studied law with his father, and was admitted to the bar in 1813. In that year President Madison sent Mr. Albert Gallatin to St. Petersburg as one of the commissioners to negotiate a treaty with Great Britain with the aid of the Russian emperor. Mr. Gallatin took Mr. Dallas as his private secretary, and when the British Government declined the mediation of the Czar, the commissioners sent their young companion to London to make arrangements for a meeting elsewhere. Ghent was the place selected, but before the treaty was concluded a year later, Mr. Dallas had returned to the United States, bringing the first proposals of Great Britain, which were so unjust that they revived the war-spirit in the country. After assisting his father for some time in his arduous duties as Secretary of the Treasury, Mr. Dallas devoted himself to the practice of his profession, and was solicitor of the United States Bank. He delivered his first public oration July 4, 1815, in vindication of the course of the United States in the controversy with Great Britain. In 1817 he was appointed deputy attorney-general for the city of Philadelphia. In 1828 he was elected mayor of Philadelphia, but soon resigned the office to accept that of United States district attorney. In 1831 he was elected by the Pennsylvania legislature to the United States Senate, and was one of the youngest members of that body. He made his first speech Jan. 9, 1832, when he presented the application of the United States Bank for the renewal of its charter, which had originally been granted at the instance of his father when he undertook the responsibilities of the Treasury. Mr. Dallas voted for the bill to renew the charter at every stage of its passage, but in the Presidential contest later in the year he supported his personal friend, Gen. Jackson, who had shown persistent hostility to the bank. In 1837, President Van Buren appointed him minister to Russia, where he remained till October, 1839, when he was recalled at his own request. He spent the next four years in the practice of his profession in Philadelphia, having declined the office of attorney-general of the United States. In 1844 he was nominated by the Democratic party for the Vice-Presidency, and was elected. He had heretofore been an advocate of protection, and was nominated expressly to secure the vote of friends of that system; yet when the Tariff act of 1846, which was a free-trade measure, was before the Senate, he gave the casting vote in its favor, thus repealing the protective tariff of 1842. In an address to the Senate he gave his reasons for this action, declaring that he was convinced that a majority of the States desired a change in the tariff, and "he did not feel at liberty to counteract by his single vote the general will." He defended the treaty of the United States with Mexico in 1848 as an honorable example of magnanimity to a conquered foe. He again resumed his place at the Philadelphia bar, but in 1856 was appointed by President Buchanan minister to England. He showed great skill in the management of the Central American question, as well as in his course with regard to the recall of Sir John Crampton, the British minister at Washington. Although his diplomatic business was important and intricate, he found time to write a *Series of Letters from London in the Years 1856–1860*, which were published in 1869. He returned in 1861, and thenceforth spent his life in privacy, but he freely declared his detestation of the "pernicious sorceries of nullification and secession." He died at Philadelphia, Dec. 31, 1864. Mr. Dallas was an emi-

ment lawyer, a distinguished statesman, an able diplomatist, and a refined and cultivated gentleman.

DALLES, or THE DALLES CITY, the county-seat of Wasco co., Oregon, is on the S. bank of Columbia River, 110 miles E. of Portland, Oregon, 50 miles above the Cascades and 5 miles below the cataract known as the Dalles. The river is here a mile wide and is crossed by a steam-ferry; the line of the Oregon Rail and Navigation Company passes along the river bank. The town has 3 large hotels, a weekly newspaper, 6 churches, an academy, and various industries. At the Dalles the stream passes between cliffs of basaltic rock and is only 200 feet wide. Population, 1100.

DALL' ONGARO, FRANCESCO (1808–1873), an Italian poet, born in humble life at Oderzo, in Friuli, in 1808. He was educated at Venice and Padua and became a priest, but some years later left that profession and began a diversified career as a journalist, dramatist, teacher, public reader, and political agitator. In 1838 appeared his dramas, *Il Fornaretto*, *I Dalmati*, and *Marco Crabieric*, followed by *L'ultimo dei Baroni*. He composed the tragedy *Bianca Capello* for Madame Ristori, and *Fasma* and *Il Tesoro* for Salvini. His *Ballate* and *Stornelli* were attempts in the vein of popular poetry. Expelled from Trieste in 1847 on account of his free expressions of political opinions, he established, during the temporary success of the republic of 1848, in Venice, a journal called *Fatti e non parole*, "Deeds, Not Words." He took part in the Roman revolution of the same year, but was in 1852 banished to Switzerland, whence he was soon expelled by Austrian influence. He lived seven years in Belgium and France, gaining subsistence by his pen and his literary lectures. In later years he held literary professorships in Milan, Venice, and Naples, and died in the last-named city, Jan. 10, 1873. His poetry, tales, dramas, and lectures on literature were for a time highly popular, and he still takes rank as one of the best of recent Italian lyric poets.

DALTON, a city of Georgia, county-seat of Whitfield co., is 99 miles N. of Atlanta, on the Western and Atlantic Railroad, and on the East Tennessee, Virginia, and Georgia Railroad. It has a park, a national bank, a public hall, 2 hotels, 2 weekly newspapers, 10 churches, a high school and 5 other schools, and is the seat of Dalton Female College. It was settled in 1844, incorporated in 1850, and was nearly destroyed by Gen. Sherman's army during the civil war. It has since revived, and is now a growing town. Population, 3030.

DALTON, JOHN CALL, M. D., an American embryologist and physiologist, was born at Chelmsford, Mass., Feb. 2, 1825. He graduated in 1844 at Harvard College, and received his medical degree in 1847. He was professor of physiology in a medical school at Buffalo, in 1851–54; in the medical college of Vermont, 1854–57; in Long Island College hospital, 1859–61; and in 1855 was called to the chair of physiology in the New York College of Physicians and Surgeons. He early became distinguished for his original observations and discoveries, and published many important scientific papers. His *Treatise on Human Physiology* (1859) is a work of high value. During a large part of the civil war he was actively employed in the medical corps of the army.

DAMAGES are the pecuniary satisfaction which a plaintiff may obtain by success in an action, either as a compensation for an injury done him, or in satisfaction of a wrong which he may have sustained. The amount is usually assessed by the jury or referee before whom the case is tried, according to the facts and circumstances as proven or shown by the evidence in the case. The amount or nature of the damages necessarily depends upon the nature of the action. In some instances they may be actual, and in others nominal. They are actual when an injury is done a person which results in his sustaining positive damages, as when a person is injured by means of the act of the defendant; there the actual loss of time and money are the guide to the assessment of damages: or where damages arise in the natural course of events, as the non-payment of money, or the non-delivery of goods; in the former case the party loses the benefit of his money, or has to provide himself with money elsewhere; in such instance the damage is the amount of money due, with legal interest, and the cost of suit. In the latter case, by the non-delivery of the goods, he is compelled to procure goods elsewhere, and the criterion of damage is the difference between the price purchased and the price he was compelled to purchase in order to meet the orders predicated upon purchase of the goods which were not delivered; and, in the event of his failure to procure the goods elsewhere, the damage is the loss he sustained by not being able to fill his orders, by reason of the non-delivery. Actual damages also arise from an injury done by means of an illegal distress for rent: in this case the damages would be the actual injury done the plaintiff, to his character or business, because of the distress. In an action for malicious prosecution the law awards damages commensurate with the actual injury done the plaintiff, or the loss sustained by him by reason of the prosecution; but malice on the part of the prosecution must be here fully shown, in order to sustain the action. Damages are nominal where no evidence of loss is given; as in the case of an invasion of a man's property by riding over it, even though the plaintiff sustain no injury from it, it is an invasion of his property, for the other had no right to come there; or in an action for breach of contract, where no actual injury is shown, no more than nominal damages are recoverable. Every injury imports a damage where a man is thereby hindered of his rights. The maxim, *de minimis non curat lex*, when properly applied to prevent a recovery in any action has reference to the injury and not the resulting damage, but in action for a wrongful or positive invasion of property this doctrine is not applicable, as any violation of a right imports some damage, and if none are proven, the law gives nominal damages to protect the right. Damages are termed remote when, although arising out of the cause of action, loss does not immediately and necessarily flow from it, and it cannot be shown that in the ordinary course of things damage would flow from the act. Though the lines of distinction are very clearly drawn by the law, yet considerable latitude is granted in the ascertainment of correct mode of the computation of damages; as for instance, in an action for an injury done the profits arising from the legitimate business of the plaintiff, and interrupted by the physical or mental injury caused him by the defendant's neglect, are proper subjects of compensation in damages; as also in the estimating of damages for death caused by collision of trains on a railroad, the age, habits, health, and pursuits of the plaintiff may be taken into consideration as a means of ascertaining the damage suffered. The measure of damage for conversion of shares of stock loaned, where the value has risen since the conversion, is the value at the time of the sale. There is also a damage known to the law as exemplary

See Vol. VI. p. 693 Am. ed. (p. 787 Edin. ed.).

damage, which mean such damages as would be a good round compensation and an adequate recompense for the injury sustained, and serve for a wholesome example to others in like cases.

The courts under the laws exercise a discretionary power over damages, as to whether the verdict or award shall stand, by the granting of a new trial in such cases where in their opinion the damages awarded are excessive or too small. The courts are vested with this power in order that they may grant that necessary protection to suitors that the law in all cases guarantees. If, however, the parties consider themselves aggrieved by such action of the court, when refusing a new trial (their power in granting a new trial is final) either that the court misinterpreted or misapplied the law, they have their proper remedy by the way of an appeal to the higher court of the State or county, which upon a proper review of the subject will correct such error as may exist in the lower finding. Damages are recoverable in all personal actions, and must necessarily be recovered in all cases where a person is entitled to a verdict or reward. (F. H.)

DAMIAN, PETER (1007–1072), Lat. *Petrus Damiani*, Ital. *Pier Damiano*, a saint and doctor of the Roman Church, was born at Ravenna, in 1007. His father, though poor, was of high lineage, but his mother is said to have refused to care for him in infancy, and he was supported by a brother, who a few years later sent him into the fields, half naked, to herd swine. But another brother, Damianus, an archdeacon, sent the little Peter to the best schools of the time, and the latter, from gratitude, afterwards called himself *Petrus Damiani*, "Peter, Damian's brother." Having been carefully schooled at Ravenna, Faenza, and Parma, he taught for some years in his native city with great applause. When nearly 30 years old he suddenly renounced the world and became a hermit of the order of Fonte Avellana, a congregation now long extinct, its members having been transferred in 1570 to the Camaldulians. As a monk he outdid his brethren in those austerities to which he was already no stranger; and after having been made abbot (in 1041) he introduced a new system of self-flagellation by way of penance. This system was taken up with such avidity that Damian was compelled to interfere, in order to restrain the brethren from dangerous excesses of self-punishment. He was a born leader of men, and all those Italians who favored strict monastic rules looked to him for encouragement and help. The people hailed him as a great saint, and the Emperor Henry III. courted his favor. But Damian, while he maintained intimate relations with the emperor and gladly favored all his reforms, was, like his colleague Hildebrand, a hearty defender of the papal prerogative and the church's autonomy. He was the adviser and minister of several successive occupants of the Holy See. In 1057 he was made a cardinal and bishop of Ostia, and in 1058 he vigorously opposed the election of Benedict X., and soon after induced that unworthy pontiff to resign. Since that time all the papal elections have been made by the cardinals. In 1062 he persuaded the antipope, Honorius II., to renounce his claims to the tiara, and then at once obtained leave to abandon his preferments and retire again to his cell. His *Liber Gomorrhianus* sets forth in stern language the evil practices too prevalent among the clergy of his time—practices which, including concubinage, simony, pluralism, and kindred vices, for a time seemed too strong for him to contend with. But Damian was the man for the hour; his conscience was aflame with love for the church and desire for the reformation of the lives of clergy and people. In 1062 he became confessor to Agnes, the empress dowager, who had opposed some of his reforms. In 1063 he went to France, inspected the clergy, and unfrocked the bishops of Chartres and Orleans, who had been guilty of simony. In 1069 as papal legate he prevented Henry IV. from divorcing his wife Bertha. He also settled the Lombard schism. Worn out by labors and by the rigors of a self-imposed discipline he died at Faenza, of a fever, Feb. 23, 1072. His works have been often published. Bassaini's edition in 4 vols. folio is called the best. His writings include many letters, some sermons, lives of the saints, a tractate *De correctione episcopi et papæ* and a *Disceptatio synodalis inter Imperii advocatum et ecclesiæ defensorem*. At least one hymn of rare excellence is ascribed to him. His life has been written by Laderchi, 1702; by Vogel, 1856; by the Bollandists; by Capecelatro, 1862; by Neukirch, 1876; and by Kleinermann, 1882. Zeal for the honor of the Virgin Mary and extreme claims in regard to the advantages derivable from ascetic practices are noteworthy in his teachings. Whatever estimate we may form of his opinions, there can be no doubt that he was a great light in one of the darkest periods of mediæval times.

DANA, CHARLES ANDERSON, an American journalist, was born at Hinsdale, N. H., Aug. 8, 1819. Receiving a classical education, he spent two years at Harvard College, and then left on account of a disease of the eyes. In 1841 he joined with other persons of literary tastes and utopian ideas in forming the Brook Farm Community at Roxbury, Mass., and was one of the editors of the *Harbinger*, a weekly paper which advocated the socialist ideas of Fourier. He afterwards contributed to the Boston *Chronotype*, and in 1847 became assistant editor of the New York *Tribune*, taking charge especially of the foreign department. He was also managing editor for some years, until his famous editorials "On to Richmond" in 1861 caused a disagreement with Horace Greeley, in consequence of which Mr. Dana left the *Tribune*. In 1863 he was appointed by Secretary Stanton assistant Secretary of War, and was employed chiefly in the West in forwarding the military movements under Gen. Grant. Soon after the close of the war he became editor of the Chicago *Republican*, but that paper not proving successful, he returned to New York, and with some others purchased the New York *Sun*, which for thirty years had been a successful one-cent paper. Mr. Dana raised the price to two cents and largely increased the circulation. Of the first number, Jan. 1, 1868, 43,000 copies were issued, and since that time its circulation has occasionally reached 100,000. It has been sensational and personal, but has been managed with great ability. Mr. Dana is a vigorous writer and forcible speaker, well informed on all subjects of general interest, quick and bold in expressing his ideas. Besides his labors as a journalist he has compiled the *Household Book of Poetry* (1858), and in connection with George Ripley, literary editor of the New York *Tribune*, he edited Appletons' *New American Cyclopædia* (1858–63). In 1873 the first volume of a new edition was published under the name *The American Cyclopædia*, and the work was completed in 1876.

DANA, FRANCIS, LL.D. (1743–1811), an American statesman and jurist, was born at Charlestown, Mass., June 13, 1743. He was a son of Judge Richard Dana, and fourth in descent from Richard Dana, who settled at Cambridge in 1640. He graduated at Harvard Col-

lege in 1762, was admitted to the bar in 1767, and joined the "Sons of Liberty." In 1774 he was chosen to the first provincial congress of Massachusetts, and the next year visited England on behalf of the colony. In May, 1776, he was made a member of the council which acted as the executive of Massachusetts till 1780. He was also delegate to the Continental Congress in 1777 and 1778, and spent some months at Valley Forge. He was secretary to the embassy sent in 1779 to negotiate the treaty of peace with Great Britain, and arrived at Paris in February, 1780. The next year he was appointed minister to Russia, and spent two years at St. Petersburg. In December, 1783, he returned to the United States, and was again elected to Congress. In 1785, Gov. Hancock appointed him a justice of the supreme court of Massachusetts. Although chosen a delegate to the convention which framed the Federal Constitution, he was, on account of ill health and his duties as judge, unable to attend, but he advocated its adoption in the State convention. In 1791 he was appointed chief-justice of Massachusetts, which position he held for fifteen years. After his retirement in 1806 he gave much attention to various enterprises for the public benefit, and was one of the founders of the American Academy of Arts and Sciences. He was an earnest, high-toned Federalist, an eloquent public speaker, an influential member of Congress, an upright and learned judge, and a successful diplomatist. He married a daughter of William Ellery, one of the signers of the Declaration of Independence. He died at Cambridge, April 25, 1811. His public correspondence is given in Sparks's *Diplomatic Correspondence of the Revolution*, vol. viii.

DANA, JAMES DWIGHT, an American geologist, mineralogist, and naturalist, was born at Utica, N. Y., Feb. 12, 1813. He graduated at Yale College in 1833, and during the years 1838–42 was one of the scientific corps of the U. S. exploring expedition around the world under Capt. Wilkes, having charge of the departments of geology, mineralogy, zoophytes, and crustacea. In 1844 he married a daughter of Prof. Benjamin Silliman. In 1850 he was appointed to the chair of geology and natural history at Yale, and in 1855 entered on its duties, in which he still continues. In 1846 he became one of the editors of the *American Journal of Science*, established by Prof. Silliman, and in 1878 the proprietor of this journal, in which he was associated with his son, Mr. Edward S. Dana. In 1837 he published a *System of Mineralogy*, the fifth edition of which was issued in 1868. As results of his exploring-expedition labors he published in 1846 *Report on Zoophytes;* in 1849, *Report on the Geology of the Pacific;* and in 1852–54, *Report on Crustacea*, each report in quarto and illustrated with folio volumes of plates. In 1862 he published his *Manual of Geology*, which reached its third edition in 1880; and in 1872 his *Coral and Coral Islands*. His smaller works are a *Manual of Mineralogy* (1854, the third edition of which appeared in 1878 under the title *Manual of Mineralogy and Lithology*), *Text-Book of Geology* (1863, 1874, 1877), *The Geological Story briefly Told* (1875). He is the author of many memoirs on geology, mineralogy, and zoology, published for the most part in the *American Journal of Science*.

DANA, RICHARD HENRY (1787–1879), a distinguished American poet, was born at Cambridge, Mass., Nov. 15, 1787. He was a son of Chief-Justice Francis Dana, and was educated at Harvard, but having taken part in a college rebellion in 1807, refused to submit to the terms imposed, and finished his studies privately at Newport. In 1819 the college authorities, relenting, conferred on him the degree as of 1808. He studied law at Boston and at Baltimore, and was admitted to the bar in the former city in 1811. For a time he took an active part in politics and was a member of the legislature, but on account of infirm health and his literary inclinations he abandoned his profession. He was one of the founders of the *North American Review* in 1814, and in it his first writings were published. In 1818 he became associate editor of the *Review*, but two years later withdrew, and for a year published a serial consisting of tales and essays, and called *The Idle Man*, in which he was assisted by his friends, W. C. Bryant and Washington Allston. In 1825, Mr. Dana contributed to the *New York Review*, edited by Bryant, his first poem, "The Dying Raven," and in 1827 appeared his most celebrated poem, "The Buccaneer." His collected poems and prose writings were published in 1833, and again in 1850. He also delivered a course of lectures on Shakespeare, which evinced a profound study of the characters delineated by the great master. In the Unitarian controversy in Massachusetts about 1830, Mr. Dana, then a Congregationalist, took an active part on the Trinitarian side, but he subsequently joined the Episcopal Church. He died at Cambridge, Mass., Feb. 2, 1879. While he wrote but little, and never attained popularity, his poems have been highly esteemed and praised by the ablest critics. His style is severe in its simplicity; his power lies in his dramatic treatment of the strong and gloomy passions, yet he also excels in pathos and in descriptions of certain aspects of Nature.

DANA, RICHARD HENRY, JR. (1815–1882), an American lawyer and author, son of R. H. Dana the poet, was born at Cambridge, Mass., Aug. 1, 1815. He entered Harvard College, but during his course an attack of measles so injured his sight that he gave up his studies, and Aug. 14, 1834, shipped as a common sailor on the brig Pilgrim on a voyage to California around Cape Horn. This adventure he afterwards described in his entertaining volume, *Two Years Before the Mast*, which passed through numerous editions, was republished in England, and translated into several European languages. He returned thoroughly invigorated in health, resumed his studies, graduated at Harvard in 1837, studied law, and at the same time acted as tutor in the college. In 1840 he was admitted to the bar, began to practise, especially in admiralty cases, and the next year published a manual of the laws and customs of the sea, called *The Seaman's Friend*, republished in England as *The Seaman's Manual*. He was engaged in some of the most prominent cases in the New England courts, defended the right to use the Bible in the public schools, and discussed the relations between the civil law and the ecclesiastical laws of different denominations. In 1848 he took part in the convention at Buffalo which formed the Free-Soil party, and in 1853 was a member of the Massachusetts constitutional convention. He defended the rescuers of the slave Shadrach in 1853, and of Anthony Burns in 1854, and was in consequence brutally assaulted on the street. When the Republican party arose he became a prominent member of it, taking part in all the Presidential campaigns from 1856 to 1876. In 1859 and 1860 he made a voyage around the world. In 1861 he was appointed United States attorney for Massachusetts, and became noted for his arguments in the prize cases occasioned by the war,

the principles he laid down being confirmed by the decision of the United States Supreme Court. He drew up the prize act of 1864. In 1866, Mr. Dana received the degree of LL.D. from Harvard College, and for a time delivered lectures on international law in the law school of that college. In 1867 and 1868 he was a member of the Massachusetts legislature and chairman of the committee on the judiciary. In 1868, at the request of the family of Mr. Wheaton, he published an edition of Wheaton's *Elements of International Law*, enriched with valuable notes, which were frequently cited in the arbitration of the Alabama claims at Geneva in 1872. This work, however, led to a most unpleasant controversy with Mr. W. B. Lawrence, who, having also published annotated editions of Wheaton's *Elements* in 1855 and in 1863, charged Mr. Dana with infringing his copyright. In 1869 he republished his popular work, *Two Years Before the Mast*, with an additional chapter, giving an account of his later visit to California and further information about persons and ships mentioned in the work. His other literary labor consisted chiefly of contributions to the *North American Review* and memoirs of Prof. Edward Channing and Washington Allston prefixed to their published works. In 1876 he was nominated by President Grant as minister to England, but on account of the dispute with Mr. Lawrence was rejected by the Senate. He afterwards went to Europe to pursue his studies in international law, and died at Rome, Jan. 7, 1882.

DANBURY, a town of Connecticut, one of the county-seats of Fairfield county, on Still River, and at the junction of the Danbury and Norwalk Railroad with a branch of the Housatonic Railroad, 67 miles by rail N. N. E. of New York. It is also on the New York and New England Railroad. Danbury contains a court-house, 2 national banks and 2 savings, 9 churches, a large subscription library, 2 hotels, and an opera-house. The making of hats is extensively carried on, and is the principal industry; sewing-machines, shirts, and boots and shoes are also manufactured. Danbury was settled in 1684, and was attacked and burned by the British under Gen. Tryon, in 1777, when the patriot, Gen. Wooster, fell, mortally wounded. The township has a population, by the census of 1890, of 19,385.

See Vol. VI. p. 702 Am. ed. (p. 797 Edin. ed.).

DANIEL, BOOK OF. The most common form of the traditional opinion concerning this book is that it was written by Daniel himself, that the narrative parts of it are faithful records of historical events, and that the predictive parts are genuine prophetic anticipations of the future. The traditional opinion has been greatly divided as to whether these predicted events close with the times of Antiochus Epiphanes, or extend forward so as to include the Roman Empire and the coming of Christ. But the article in the ENCYCLOPÆDIA BRITANNICA holds that the book was either originally written, or at least written in its present form, as late as the reign of Antiochus Epiphanes (175–164 B. C.); and that the predictive parts of it are therefore history presented in the form of prediction, and the narrative parts, probably, stories of fictitious events; both written, of course, for pious and patriotic purposes.

See Vol. VI. p. 707 Am. ed. (p. 803 Edin. ed.).

The proof that Daniel himself wrote the book is, strictly speaking, not decisive. The title may conceivably be counted as indicating the subject of the book, and not its author; although ancient tradition uniformly understood it as pointing to the author. But the proof that Daniel was a historical personage, and that the book was written either by himself or by some contemporary of his (that is, as early as within the time of one generation after his death), stands on a footing altogether different.

In evidence of the late composition of the book it is alleged that it has not those marks of a Babylonian origin which we should look for in a work written in Babylonia in the times in which Daniel is said to have lived, though it is admitted that it bears the impress of Babylonian ideas to a certain extent. The alleged late author of the book, it is affirmed, must have been a student of history, and was quite successful in his attempt to reproduce the times of which he treated. But he was not so successful that modern criticism cannot detect his failures. It would be impossible to avoid the admission that this Babylonian element is in the book of Daniel. The evidence for it is clear and abundant. But in the face of it, any proofs drawn from the book itself to the effect that it was not written in Babylon nor till long after the Babylonian period, need to be equally unmistakable, in order to entitle them to recognition.

It is said, for example, that the writer of the book of Daniel has blundered in his use of proper names as no one would have blundered who had lived in Babylon before the Persian period. "The writer of Daniel evidently supposes that Belteshazzar is compounded with the name of Bel," and is mistaken in so supposing. But we need not necessarily hold that he supposes so. The king's language in the verse cited may imply no more than that there was a resemblance between the names. Moreover, in the present state of knowledge, one had better be modest in his assertions that there is here no genuine etymological connection. And even if it be admitted that the writer intended to derive Belteshazzar from Bel, and that he is mistaken, it is still the easiest thing in the world to explain this as an instance of philological corruption, like those which are supposed to be found in the names Hamelsar (Melzar) and Abed Nego. And if it be conceded, as it seems that it must be, that the two latter are, lingually, corrupt Babylonian names, and that Arioch is the revival of an ancient Accadian name, this has a positive weight in favor of the Babylonian origin of the book, which no merely negative testimony can counterbalance.

It is further alleged that the names Ashpenaz, Shadrach, and Meshach "cannot be explained at all." But, like many other things that we cannot yet explain, they may nevertheless be facts.

The book is said to contain nine or more words of Persian origin, while no Persian words occur in Ezekiel, Haggai, Zechariah, or Malachi. But Daniel is represented as having lived till after the Persian conquest. And until the Persians conquered the Babylonians they had been subject to the Babylonians. There must have been Persians at the Babylonian court. If Daniel or some contemporary, much of whose life was spent at court, wrote this book, there is nothing strange in its containing Persian words, even if men like Ezekiel, whose lives were spent away from court, used no Persian. There are Persian words in Ezra and Esther, as well as in Daniel. Moreover, according to Zöckler, of the seven Persian words which occur in the Chaldee of Daniel, only one is found in that of the Targums. The book of Daniel, therefore, seems to belong to an earlier period, when the Persian influence was very

strong, leading to the introduction of many Persian words into the Israelitish vocabulary, and not to a latter period when this influence had faded, and the Persian words had been mostly dropped.

Stress is also laid upon the fact that the book contains three or four Greek names of musical instruments. It is argued that this shows that Daniel cannot have been written until some time in the Greek period, after the fall of the Persian empire. We are even asked to notice that among the musical instruments mentioned is the Greek *Symphonia* or bag-pipe, an instrument which was a favorite of Antiochus Epiphanes. Has not this great weight to prove that the writing of the book belongs to the times of that monarch? If this be reasoning we may, by processes precisely parallel, prove the writing of the book to have been contemporaneous with almost every music-loving Greek prince from Agamemnon down. If any one of the Greek names of musical instruments mentioned in this verse can be cited in evidence as to the date, it is the term κίθαρις, lyre. This is a Homeric word. The Greek translation has, instead of it, κιθάρα, which is the current form in all Greek writings except the earliest. The inference is that this narrative was most probably written before the latter of these terms had superseded the former in common usage—that is, not much later than the time of Daniel. For the rest, why should not Greek minstrels find their way to the luxurious Babylonian court as early as the reign of Nebuchadnezzar, bringing Greek terms with them? And if, in the times of Joel, the Tyrians had been in the habit of selling Israelites as slaves to the Grecians (Joel iii. 6), what should hinder a few Greek terms from having found their way into the vocabulary of a contemporary of Daniel? Long before the birth of Daniel, Sargon of Assyria claimed Javan among his tributaries. Strabo testifies (xiii. 3, 2) that there was a Greek element in the armies of Nebuchadnezzar.

In Dan. vi. 1 it is said that Darius the Mede appointed 120 satraps. But an inscription of Darius Hystaspis mentions only 23 satrapies. It is therefore inferred that the author of Daniel applies the term satrap to subordinate governing officers. But the Greek translator of 1 Kings x. 15 has used the term satrap in the same way. Hence it is argued that the author of the book of Daniel must have been a contemporary of this Greek translator, in the second century before Christ. By reasoning in all respects parallel to this, if a Turkish or Egyptian correspondent of an American newspaper, in the year 1884, should apply the term *Bey* to some official who was only a *Pacha*, this use of terms would prove him to be a contemporary of the author of Daniel.

To these supposed philological reasons against the antiquity of the book certain historical reasons are added. The strongest of these has been supposed to be the mention of Belshazzar. It has been urged, not only that this man is not mentioned in other history, but that the statements made in other history are such as to show that he never existed. These difficulties were regarded as removed only in part by the discovery of Belshazzar's name in the inscription mentioned in the ENCYCLOPÆDIA BRITANNICA. But in 1879 an inscription of Cyrus the Great was translated by Mr. T. G. Pinches, which mentions Belshazzar, not indeed by name, but as the son of Nabonidus, and in such a way as to make the identification of him complete. This last discovery, added to what had been previously learned, sets the matter entirely at rest; Belshazzar is now known to be precisely the historical personage which the book of Daniel represents him to be. This proves that the author of this book had access to sources of historical information which have been neglected by the other historians whose works have come down to us.

Next to the difficulties in this case stress has been laid on those concerning Darius the Mede. It is not easy certainly to identify him with any person mentioned in profane history. But now that the more difficult problem of the historicity of Belshazzar has been conclusively solved it would be foolish to be overconfident that the less difficult problem concerning Darius is incapable of solution.

Certain contradictions with other history are also alleged against the first chapter of Daniel. "If the battle of Carchemish took place in the fourth year of Jehoiakim (Jer. xlvi. 2), Jerusalem cannot have been captured in the third; and our one certainly contemporary authority, the prophet Jeremiah, nowhere alludes to a captivity at this period." But Dan. i. does not say that Jerusalem was captured at this time. It affirms that Nebuchadnezzar gained important successes, and that captives and spoils from the temple somehow fell into his hands, and were carried to Babylon. This was in the accession-year of Nebuchadnezzar. Coming to the throne in this year, his first year was nevertheless, according to Babylonian custom, counted from the following New Year's day, and was the 4th of Jehoiakim, and the year of the battle of Carchemish. And even if it be true that no other author mentions this particular item in the deportation of Judah, that has little weight against its historical character; for the deportation occurred in several successive expeditions, in different years. Several of these are mentioned just once and no more. See 2 Kings xxiv. 12, 17; Jer. lii. 24–30, and parallel passages.

The alleged contradictions between the different parts of the book, *e. g.*, the allegation that Arioch's introduction of Daniel (ii. 25), as "one of the captives of Judah," is inconsistent with the statements in chap. i., are too readily explicable to be of any considerable weight. And what weight they have would simply go to show that the book was composed in parts, either by one author or more than one, and not that it was of late date. Indeed, a late author, writing a piece of historical fiction, would be much less likely than a contemporaneous narrator to have left the earlier narratives in it (the account, for instance, of what became of Daniel's three companions) so incomplete; for it is characteristic of fiction of this sort to give to its creations the completeness which is often lacking in the incidents that occur in actual life.

It is further alleged that the ninth chapter "suggests a very late origin for the book by the way in which the prophets are looked back upon (ver. 6, 10); and the minute study of the works of the prophets described in verse 2 seems to many to point to a time when prophetic inspiration had ceased, and the prophetic writings (here called 'the books') were already collected." It certainly points to a time when there were already collections of the sacred books; but that is not necessarily a time when prophetic inspiration had ceased. This passage may prove that the Jews possessed and studied collections of the prophetic writings, during the 70 years of the captivity, instead of proving that the book of Daniel was written at a later date.

Again, it is urged that this book teaches the doctrine of a resurrection, and of angels; and must have drawn

these from Persian sources, and must therefore be of late origin. But even if it be admitted that the book drew these doctrines from Persian sources, those sources may easily have been within the reach of such a man as Daniel, in the times of Cyrus, or even in those of Nebuchadnezzar. And if the presence of these doctrines proves the late origin of Daniel, then it equally proves a late origin for the 25th of Isaiah, for many of the Psalms commonly ascribed to David, and for other parts of the Old Testament. The more usual modes of weighing evidence would lead one to pronounce the doctrines ancient, on the ground of their being mentioned in so many ancient documents, rather than to assume that the doctrines cannot be ancient, and that the writings which contain them must therefore forfeit their claim to antiquity.

Finally, it is alleged that the predictive element in Daniel is evidently of the apocalyptic order, and not genuine prediction (even if there is any such thing as genuine prediction), and therefore must have been written after the event. This argument would have no weight except with those who believe that the predictions of the book terminate upon Antiochus Epiphanes. If any of its predictions point to events later than his time, they, of course, are genuine and not merely apocalyptic. And if none of them do this, it is still conceivable that they may be genuine, if there be any such thing as genuine prediction, and, therefore, that the book may be of earlier date. And it would hardly be claimed that the ear-marks by which these predictions are said to be shown to be spurious are such as to convince one who believes in the possibility of genuine prophetic prediction, and who is not otherwise convinced of the late origin of the book.

Men who hold to the impossibility of predictive prophecy must of course regard the book as following the course of history down to the times of Antiochus, and must regard this circumstance as determining its date. But apart from this it can hardly be said that there is any very strong internal evidence for dating it later than the times of Daniel. The external evidence of its early date is very strong, but can be briefly presented.

First, there can be no doubt that Daniel was regarded as one of the books of the Old Testament canon from the earliest times in which we can trace the existence of that canon. All the evidence, therefore, which goes to prove that the Old Testament was complete as early as about 400 B. C. goes to prove that the book of Daniel was then already in existence. (See BIBLE.)

Secondly, Josephus testifies (Ant. xi. 8, 5) that the book of Daniel was shown to Alexander the Great, by the high priest Jaddua, about B. C. 333; and that Alexander was greatly influenced by finding in it the predictions concerning himself. This implies, of course, that the book was then already old enough so that the fulfilment of its predictions would seem remarkable. It is currently objected to this that much of what Josephus says about Jaddua is in contradiction with the statements of the book of Nehemiah, and is therefore fabulous, and hence that this statement of his cannot be depended upon. But it is shown in the article on the BIBLE that the other parts of his account of Jaddua can be depended upon. This gives the greater credibility to his statement concerning the book of Daniel.

Ewald assigns the first part of the apocryphal book of Baruch to the times of the Persian empire. But this book (i. 1. and ii.) clearly presupposes the existence of our book of Daniel. In 1 Mac. ii. 59, Mattathias, during the lifetime of Antiochus Epiphanes, is represented as citing Daniel and his companions along with Abraham, Caleb, Elijah, David, and other ancient worthies. Passages in the other apocryphal books, in the Septuagint, and in Zechariah, are claimed as presupposing the existence of the book of Daniel, in a continuous chain of evidence, back to the time of Ezra and the second Temple. And although much of this evidence is disputed, it may at least fairly claim to be of greater force than the evidence for the late origin of the book.

Finally, there is a close connection between the view one takes of the date of this book and his view of its character. If written in the Maccabean times, it is merely apocalyptic. On this hypothesis, it is difficult to see what claim it can have to a place in the canon, even if the canon had then still been open for the receiving of new books. In fact, those who hold to its late origin are quite apt to hold that its contents rank it among the apocrypha rather than among the Scriptural books. In this condition of things, the distinct testimony of the New Testament to the effect that the book of Daniel is genuinely Scriptural, prophetic, and predictive (*e. g.*, Matt. xxiv. 15), must also count as testimony to its early origin.

Literature.—Recent works on Daniel are Dr. James Strong's translation of *Zöckler's Commentary* in Schaff's *Lange's Commentary* (1876), and the article on Daniel in McClintock and Strong's *Cyclopedia*, which is especially full in its bibliographical lists. Older American works of value are the commentary of Prof. Moses Stuart (1850), and that of Prof. Cowles (1867). (W. J. B.)

DANIELSONVILLE, a borough of Windham co., Conn., is on the Quinebaug River, on the Norwich and Worcester Railroad, 26 miles N.N.E. of Norwich, and 4 miles W. of the Rhode Island line. It has 2 banks (1 national), a weekly newspaper, 3 hotels, 5 churches, a high-school, and other schools. It has several cotton-mills and other manufactories. Population, 3118.

DANSVILLE, a village of Livingston co., N. Y., is on Canaseraga Creek, and on the New York, Lackawanna, and Western Railroad, 44 miles S. of Rochester. It is the terminus of the Erie and Genesee Valley Railroad, and of the Dansville branch of the Genesee Valley Canal. Its abundant water-power is used in 4 paper-mills, flour-mills, planing-mills, machine-shops, woollen-factories, and a tannery. It has 2 banks, 3 hotels, 2 weekly newspapers, a public library, 8 churches, a seminary, and good private schools, and the "Home Hygienic Institute," a large water-cure establishment. The village is surrounded by hills, which furnish building- and flagging-stone. It was incorporated in 1845, and is named from Daniel P. Faulkner, who settled here in 1798. Population, about 4250.

DANTE. There is no evidence of American acquaintance with Dante before the present century. In 1807, Lorenzo da Ponte, a Venetian of some literary attainments, came to New York, and in the years that followed gave instruction there in Italian, reading more or less of Dante with over fifteen hundred pupils; yet he accomplished little to remove the ignorance of Dante which had prevailed ever since the country was settled. In 1815, Mr. George Ticknor of Boston, after procuring with some difficulty a copy of the *Divine Comedy* in Italian, found it impossible to obtain any help in reading it.

See Vol. VI. p. 712 Am. ed. (p. 809 Edin. ed.).

failing in his attempt to study here, Mr. Ticknor, on visiting Germany in that same year, met Balhorn, "who knew everything about Dante," and who was at that time tutor to some small prince at Göttingen. Balhorn was persuaded by the offer of some fine cigars to read and explain the *Divine Comedy* to Mr. Ticknor, who became so absorbed in its study that it was one of the few books that he constantly carried about with him.

In 1814, Cary's translation appeared in England, and soon found readers in America, so that after 1820 allusions to Dante are occasionally met with in the American magazines, and in 1822 an American reprint of Cary's version was made. The first article upon Dante which ever appeared in America was a review of this translation in the *North American* for March, 1819, by Mr. John C. Gray; which is full of interest, not only as the first American essay on the poet, but as showing the way in which the *Divine Comedy* was read by one who was still under the influence of the classical models of the eighteenth century. Mr. Gray, however, was soon to have another companion in his study of Dante. Mr. Longfellow, referring to his stay in Rome in 1827, writes in *Outre-Mer*: "In poring over the gloomy pages of Dante, or 'Bardello's laughing tale,' I protract my nightly vigil till the morning-star is in the sky;" the first record of a study which was to continue until his death.

In 1830 the Rev. E. D. Griffin gave a course of lectures at Columbia College on Roman, Italian, and English literature, devoting at least one lecture to Dante; but the course was soon ended by his early death. About the same time, Mr. Ticknor, who had been appointed to a professorship at Harvard, was giving those lectures upon Dante which were to do so much toward exciting an interest in the poet. Though not a man of distinct creative genius, he had a rare appreciation for all that was best in literature, and his return, fresh from contact with the leaders of European thought, served as one of the chief stimuli to the literary life of Boston in the years that followed. His influence upon the study of Dante was very great personally, and his rank as a Dante scholar is attested by his intercourse with Prince John of Saxony in 1836; but, unfortunately, he never published his notes on the *Divine Comedy* which he made in 1832, of which Count Circourt wrote later to Mr. Prescott, "The commentary which Mr. Ticknor has begun is one of the highest interest. Few persons in the world are so intimately acquainted with the old bard, and nowhere, perhaps, such a combination of profound learning, acute criticism, and serene elevation of mind can be found as in this highly gifted and excellent man." The next work on Dante, after an appreciative essay by Miss Inglis in the *North American* for October, 1833, was the translation of the three extracts from the *Purgatorio* by Mr. Longfellow which he published in the *Voices of the Night* in 1839, and republished in 1845 in his *Poets and Poetry of Europe*, and which he afterwards incorporated, with some slight changes, in his translation of the whole poem; the translation being of special interest as showing that he had already adopted the principle of literal, verse-for-verse, unrhymed translation. "In 1836," writes Dr. Parsons in 1865, "my father took me with him to Italy, and there I became enamored of the *Divine Comedy*." As a result of that visit he published in 1843 the first volume relating to Dante that ever appeared in America—a thin book containing a rhymed translation of the first ten cantos of the *Inferno*, prefaced by the well-known lines on a bust of Dante, and containing a few notes and a brief essay to the reader. In the same year one of Mr. Longfellow's letters shows that he was still busy with Dante. "How different from this gossip," he writes, "is the divine Dante with which I begin the morning! I write a few lines every day before breakfast. It is the first thing I do—the morning prayer—the keynote of the day. . . . I really have but a few moments to devote to it daily, yet daily a stone, small or great, is laid on the pile." In 1859 he again writes: "Long, long ago I planned a book to be called *An Introduction to the Study of Dante*. It was to contain a translation of—1. Boccaccio's Life; 2. The *Vita Nuova*; 3. The Letter of Fra Hilario; 4. The Vision of Frate Alberico; 5. Schelling on the *Divina Commedia*; 6. Anecdotes, etc. from the *Novellieri*; 7. The best things said upon Dante by Carlyle, Macaulay, and others, etc.," adding that he had relinquished the design, which afterwards he was to undertake again with such success.

After the publication of Dr. Parsons' translation in 1843 the only important contributions to the study of Dante were an essay by Mr. S. G. Brown in the *North American* for April, 1846; another by Dr. Schaff in the *American Whig Review* for August, 1848; and a translation of the second canzone of the *Convito* by the Rev. Chas. T. Brooks in the *Crayon* for February, 1858, "the happiest version of one of Dante's minor poems that exists in our language;" until, in 1859, Prof. C. E. Norton published in the *Atlantic*, and afterwards reprinted for private circulation, an essay on the *Vita Nuova*, with translations which won the praise of "tender and just" from Mr. Ruskin. It was ably reviewed by Mr. L. G. Ware in the *Christian Examiner* for November, 1862. Mr. Norton followed this work by a review in the *Atlantic* for May, 1861, of Tamburini's edition of Benvenuto da Imola's comment, which thoroughly exposed the worthlessness of that work. In 1863, Mr. Longfellow, partly from need of congenial occupation and partly in consequence of friendly urgency, was led to resume his work on Dante, and for the next four years he devoted himself to the translation of the *Divine Comedy*, meeting Mr. Lowell and Mr. Norton every Wednesday evening to go over the proof-sheets and to discuss every doubtful passage in the poem with their help and the help of all the early comments. Early in 1865 ten copies of the translation of the *Inferno* were printed, of which five were sent to Florence with a special dedication, reaching there in time for the celebration of the sixth centenary of the poet's birth in May. For this centenary Dr. Parsons had published another edition of his translation, increased to seventeen cantos, with a dedicatory letter addressed to the duke of Sermoneta. Mr. Norton, too, had printed for private circulation a small but valuable volume on the original portraits of Dante, illustrated by photographs from the death-mask and from the fac-simile of Giotto's picture of the poet in the Bargello at Florence, which he also sent to Italy; while Vincenzo Botta paid his tribute to his mother-country by sending his volume entitled *Dante, as Philosopher, Patriot, and Poet*. In April, 1866, Mr. Norton prepared the way for Mr. Longfellow's forthcoming translation by his able review in the *North American* of several new translations of the *Divine Comedy*, in which, after a critical discussion of the difficulty of adhering to rhyme and of the limits of translation, and after giving high praise to Dr. Parsons' work, he decides in favor of a literal, line-for-line translation in the metre of the original. In the following year Mr. Longfellow pub-

lished his translation of the *Divine Comedy*, which at once won the praise, which it has ever since maintained, of being "the most faithful version of Dante that has ever been made." Only a short time before his death he expressed an intention of going over the work once more and revising his translation, but deferred it until Mr. Lowell should return from Europe. In the same year Mr. Norton republished his essay on the *Vita Nuova*, but so changed as to be almost a new work; the whole of the *Vita Nuova* had been translated in the same literal style, "following the footing of his feete," which Mr. Longfellow had adopted, and to it were appended a body of admirable notes and several essays, comprising all, and more than all, that had appeared in 1859. In 1867, too, Dr. Parsons completed his translation of the *Inferno*, which has maintained its position as second only to that of Mr. Longfellow. Since that time he has been at work upon the *Purgatorio*, publishing it canto by canto in the *Catholic World*, the twenty-first canto appearing in December, 1881. Of the many reviews that these translations called forth, mention can be made only of those by Mr. Norton in the *North American* and the *Nation;* that by Mr. G. W. Greene in the *Atlantic;* and that by Mr. John Fiske in his *Unseen World* in 1876. In 1872 appeared the contribution of the last of America's four great Dante scholars to the study of the poet, Mr. Lowell's review of Miss Rossetti's *Shadow of Dante*, in the *North American* for July, and this, somewhat enlarged, forms the first essay in the second series of *Among my Books*, which appeared in 1876. This essay, the finest ever written upon Dante, supplemented his biography of the poet in the *American Cyclopædia* in 1859, which also deserves the praise of being the best biography of Dante ever written. A course of lectures on the poet was delivered in Boston before the Lowell Institute in the autumn of 1880 by Mr. Luigi Monti, and an able essay appeared anonymously in the *American Catholic Quarterly Review* for October of the same year.

From influences taking their rise in the courses of Profs. Lowell and Norton at Harvard, and having perhaps a remote origin in the lectures of Mr. Ticknor fifty years before, and in the meetings at Mr. Longfellow's and at Mr. Norton's while they were working upon their translations, there was formed in the winter of 1880–81 the Dante Society, whose object was "the encouragement of the study of the life and works of Dante." Mr. Longfellow accepted the presidency of the society, and its growth and prosperity have been chiefly due to his constant interest in all relating to Dante. The work of this society is yet in the future, but it already has a membership of fifty, and, with Dante scholars at its head like Mr. Lowell and Mr. Norton, it may well be expected to continue the work which America has already done in the study of Dante. (P. C. K., JR.)

DANVERS, a town of Massachusetts, in Essex co., is 19 miles N. by E. of Boston, on the Boston and Maine Railroad (Newburyport division), and on the Salem and Lawrence Railroad, near its junction with the Salem and Lowell branch. It has a national bank and a savings bank, 2 newspapers, a high school, the Peabody Library (free), and extensive manufactures, chiefly of boots and shoes. The adjacent village of Danvers Port has a tide-mill, and is accessible by sea-going vessels, being situated on Porter's River, an arm of Salem Harbor. Danvers is the seat of the Massachusetts Insane Asylum, one of the largest institutions of the kind in this country. The township contains also Danvers Centre and Putnamville, and is celebrated for its onions. Population of township, 7446.

See Vol. VI. p. 722 Am. ed. (p. 820 Edin. ed.).

DANVILLE, a city of Illinois, county-seat of Vermilion co., at the forks of Big Vermilion River, 124 miles by rail S. of Chicago. Through the town pass the following railroads: the Chicago and Eastern Illinois, the Indianapolis, Bloomington, and Western, the Wabash, St. Louis, and Pacific; and the Danville, Olney, and Ohio River Railroad here terminates, as also the Cairo division of the Wabash system of railways. Danville is in a fertile and well-timbered region. Coal-mining is a leading industry. The city has a court-house, 14 churches, an opera house, a high school, a national bank, locomotive, car, and railway shops. Population in 1870, 4751; in 1890, 11,528.

DANVILLE, the county-seat of Boyle co., Ky., is in the centre of the State, 114 miles S. of Cincinnati, on the Cincinnati Southern Railroad. It has a court-house, 3 hotels, 3 national banks, 2 weekly newspapers, 12 churches, and the State institution for deaf mutes. It is especially noted for its educational facilities, having an academy, the Caldwell Female College, Centre College, a Presbyterian institution founded in 1819, with which a theological seminary has been connected. Its industries are limited to a planing-mill and flour-mills. The town was first settled in 1783, and was the first capital of Kentucky. It is a handsome town, lighted with gas, and the surrounding country is famous as the Blue-grass region. Population, 3765.

See Vol. VI. p. 722 Am. ed. (p. 820 Edin. ed.).

DANVILLE, a borough of Pennsylvania, county-seat of Montour co., on the N. bank of the Susquehanna (North Branch), 67 miles N.E. of Harrisburg. The Catawissa, the Lackawanna and Bloomsburg, and the Danville, Hazleton, and Wilkesbarre Railroads accommodate the business of the town. Montour's Ridge, just N. of Danville, affords limestone and good iron ore, and anthracite coal is mined near at hand. The town is the seat of extensive iron-works, turning out pigs, castings, railway-iron, bars, and other forms of iron in great variety. Danville has about 20 churches, a State insane asylum, 3 weekly newspapers, 2 national banks. Population, 9073.

DANVILLE, a city of Virginia, in Pittsylvania co., is on the S. bank of the Dan River, and on the Richmond and Danville Railroad, the Lynchburg and Danville Railroad, the Danville and New River Railroad, and the Piedmont Railroad, 141 miles W. S.W. of Richmond, and 4 miles N. of the North Carolina line. It has gas- and water-works, 4 banks (1 national), 1 daily and 2 weekly newspapers, 10 churches, an academy, 2 female colleges, and good schools. It has good water-power, a cotton-mill, flour-mill, grist-mill, foundry, and 40 tobacco-factories. It is the centre of the fine yellow tobacco section, and 30,000,000 pounds of leaf-tobacco are sold here annually. Population, 10,285.

DARBY, JOHN NELSON (1800–1882), an English theologian and founder of the religious body commonly known as the Plymouth Brethren, was born at Westminster, London, Nov. 18, 1800. He was educated at Trinity College, Dublin, where he graduated with high classical honors. He studied law and was called to the bar, but afterwards took orders in the Church of England. About 1827 Mr. Edward Cronin, of Dublin, having investigated the nature of the Chris-

tian Church, began to deny the need of officers or ordination, asserting the right of believers, as such, to "break bread" whenever they met together as disciples of Christ. Mr. Darby soon joined the few who held these new doctrines, and they held religious meetings at a private house, but did not separate from their respective churches. Mr. Darby published a pamphlet *On the Nature and Unity of the Church of Christ* (1828), which had the effect of spreading their views. In 1830 he went to Paris and afterwards to the English Universities, and in 1832 he withdrew from the Established Church. In that year he first visited Plymouth, where he found persons of kindred views, among whom he soon became a leader. Other persons prominently connected with the movement were A. N Groves, who became a missionary to Bagdad, B. W. Newton, and at a later period S. P. Tregelles and George Müller, of Bristol. In the society which they formed they renounced all distinctive names, calling themselves simply "Brethren," but as the advocates and propagators of the views came chiefly from Plymouth, they became known as the Plymouth Brethren; on the continent of Europe they are known as Darbyites. In his *Christian Liberty of Preaching and Teaching the Lord Jesus Christ* (1834), Darby maintained that all believers had equal right to preach, though not equal gifts. In the *Christian Witness*, a periodical which he established in 1834, and in various pamphlets, French as well as English, he asserted the universal apostasy of the Christian Church, maintaining that every system, Protestant and Catholic, had failed by unfaithfulness and is condemned. But individuals are still saved by the grace of God and receive the gifts of his Spirit, which they are to use for the good of others, but they must withdraw from the corruptions of existing churches. Mr. Darby gave considerable attention to the exposition of the prophecies of Scripture. In 1838 he went to Switzerland, where he labored with considerable success, and engaged also in controversy with the Methodists. Here he prepared and issued, first in French but afterwards in English, a *Synopsis of the Books of the Bible* (5 vols.). In 1845 he returned to England and found dissensions existing at Plymouth. After investigation Darby withdrew from fellowship with Mr. Newton, the leader of that meeting, charging him with fundamental doctrinal error. Yet he did not altogether renounce fellowship with some who sympathized with Newton, as some more exclusive members insisted on doing. This division has continued to exist and to affect seriously the growth of Plymouthism. Mr. Darby was incessant in his labors with his pen, producing numerous pamphlets on religious questions of the day, in exposition of the Scriptures and on controversies connected with his peculiar views. His work on *The Sufferings of Christ* (1858) did not meet with the usual warm approval of his followers, yet no division took place among them in consequence. His subsequent work on *The Righteousness of God* (1859) had a similar effect. In 1860 and later he visited the brethren in Canada, and in 1870 he extended his journey into the United States. Special interest was excited during his later visits, and meetings were established in several cities. In 1876 he went to Australia and New Zealand, making converts and forming societies. He had continued to labor much on the continent of Europe, especially in France, Switzerland, Spain, and Italy. About 1879 a division similar to the one already mentioned took place among his followers in London, the seceders following William Kelly, a notable writer of the body. Mr. Darby died at Bournemouth, April 9, 1882.

Darby's writings comprise controversial, doctrinal, practical, and devotional treatises, yet he gave most prominence to the exposition of the Scriptures. He was an able scholar of the original languages of the Bible, and translated the Bible into German and the New Testament into French. Many of his writings were notes of lectures which he had delivered, and many were brief tracts. Altogether they are said to amount to eighty volumes. The most important of them have been edited by W. Kelly.

DARLEY, Felix O. C., an American artist, was born in Philadelphia, July 23, 1822. Darley's first artistic work was done while he was engaged as a clerk in a mercantile house. His early drawings were chiefly of a humorous character, and he was employed to furnish the illustrations for certain humorous works, and otherwise was encouraged to devote himself exclusively to art. His early designs are creditable as the performances of an untrained young man, but do not more than hint at the excellence which he afterwards achieved. They show, however, that from the first his sense of humor was keen, and that he was a quick observer of the characteristic traits of common humanity. Having resolved to devote himself to the practice of art, he seems to have found sufficient employment to keep him busy, although at that time very little was done in the way of publishing original book, magazine, and newspaper illustrations in the United States. Darley, however, had the field, such as it was, pretty much to himself. By 1850, when he was solicited by the Art Union to make some illustrations of Irving's humorous writings, to be offered to its subscribers as premiums, he was as much a master of his craft as he ever became. He prepared two sets of designs for the Art Union, one illustrating *Rip Van Winkle* and the other *The Legend of Sleepy Hollow*, and these were in every respect so felicitous that they at once advanced him in the estimation of the public to the front rank of American artists. These drawings were in outline—a style which is open to objections on artistic grounds; but for which the artist has a decided predilection. To say that these admirable designs did full justice to their subject would be to award them but partial praise, for if any comparisons were to be made between author and artist it would be in favor of the latter. The illustrations to the two stories of Irving, above mentioned, were made to order, but the other set of outline drawings, which have proceeded from Darley's hand, were executed for his own satisfaction, and owe their origin to his intense interest in their subject. A curious novel of Sylvester Judd, entitled *Margaret*—which contains some strong characteristics, and some very realistic descriptions of certain long-extinct phases of New England rural life—furnished the materials for one set, which was published in 1856, and Hawthorne's romance of *The Scarlet Letter* the materials for the other. These outline-drawings very adequately represent Darley's genius, and, without disparagement to many other admirable designs executed by him, they may be said to constitute the most valuable portion of his life-work. Among the other important set of designs made by Darley are those in illustration of Cooper's and Dickens' novels. These drawings are in light and shade, and they include all classes of subjects from the most tragic to the most comic. Darley has been a frequent contributor to the illustrated newspapers and

magazines, and he has supplied an immense number of designs for books. Although his chief employment has been as an illustrator, he has produced a considerable number of independent works, some in black-and-white and some in color. He was one of the original members of the American Society of Painters in Water Colors, and he has employed the aquarelle method in nearly all of his color work. Darley has made one or more visits to Europe, and has returned to America with greatly enriched portfolios. Among his exhibition pictures of a representative character may be mentioned The First Blow for Liberty, Foraging in Virginia, Giving Comfort to the Enemy, Attacked by Indians—this picture was painted for Prince Napoleon—Puritans Surprised by Indians, The School-Boy, The March to the Sea, The Sheepfold, Feeding the Pet, Cold Snack, and Cavalry Charge at Fredericksburg. This last-mentioned work was at the Paris Exhibition of 1867. Darley was elected a full member of the National Academy of Design, New York, in 1852, and is a member of the Artists' Fund Society of New York. He is a great artist, and, all qualities being considered, it may be doubted whether America has produced a greater one. That he has done more than any other one artist to advance the interests of American art by educating the public to a genuine liking for pictures, and to a consequent appreciation of certain artistic qualities, is certain. Darley's designs, while being marked by technical qualities of no mean importance, and without, in the majority of instances, descending to the commonplace, were fairly within the understanding and appreciation of the general public. His latest labors were the illustration of *Evangeline* (1883), and of Shakespeare's works (1888). He died near Claymont, Del., March 27, 1888.

(W. J. C., JR.)

DARLING, GRACE (1815–1842), an English heroine, was born at Bamborough, Northumberland, Nov. 24, 1815. Her father was the keeper of the Longstone lighthouse, on one of the Farne Islands, off the coast of Northumberland. On the night of Sept. 6, 1838, the steamer Forfarshire, on its way from Hull to Dundee, was wrecked on the rocks of one of the Farne group. There were 53 people on board, of whom 38 were drowned, 6 escaped by means of a boat, and when day broke on the succeeding morning the remaining 9 were perceived clinging to the wreck, in imminent danger of being swept off by the billows. Although the sea was still fearfully raging, Grace insisted on going to their rescue. She induced her father to aid her in launching a boat, and to go with her to the wreck. The exploit was successfully performed and the survivors rescued, though the storm continued so violent that it was three days before they could leave the lighthouse for the mainland. When this daring rescue became known, all Europe rang with the praise of the young heroine. Tokens of public applause were showered upon her, and a subscription of £700 was raised for her. She did not long survive her sudden fame, but died of consumption on Oct. 20, 1842.

DARLINGTON, WILLIAM, M. D., LL.D. (1782–1863), an American botanist, was born in Birmingham, Chester co., Pa., April 28, 1782. In early life he worked on a farm, then studied medicine, and received the degree of M. D. from the University of Pennsylvania in 1804. Two years later he sailed to India as ship's surgeon, and afterwards published in the *Analectic Magazine* an account of his voyage under the title Letters from Calcutta." After his return, in 1807, he practised his profession in West Chester, taking part also in politics. In the war of 1812 he raised a company in his neighborhood, and in 1814 was chosen major of a militia regiment. He was elected to Congress as a Democrat in 1815, and again in 1819 and 1821. He did much to improve the literary and social culture of the community, founding in West Chester an academy, an athenæum, and a society for the study of natural history. In 1813 he began a descriptive catalogue of the plants in Chester county, which he continued to improve and enlarge in successive editions, under the title of *Flora Cestrica* (3d ed. 1853). It is one of the most complete local Floras ever prepared. He published also *Mutual Influence of Health and Disease* (1806), *Agricultural Botany* (1847), *Agricultural Chemistry* (1847), *Memorials of John Bartram and Humphrey Marshall* (1849). He also edited in 1843 the correspondence of Dr. William Baldwin, with a memoir, under the title, *Reliquiæ Baldwinianæ*. In 1853 he published the *Sesqui-Centennial Gathering of the Clan Darlington*, which contained a genealogical account of the descendants of his ancestor, Abraham Darlington, an English Quaker. He prepared a *History of West Chester*, with a valuable paper on Mason and Dixon's Line, which was published in the *West Chester Directory* for 1857. He also published in a local newspaper *Notæ Cestrienses*, or notices of Chester county men and events. Many of his literary and scientific addresses were published in pamphlet form. His style was easy, mingling wit and humor with knowledge and instruction. In 1848, Yale College conferred on him the degree of LL.D., and in 1855, Dickinson College gave him that of doctor of physical science. He was a member of more than forty literary and scientific societies, among which were the American Philosophical Society and the Botanical Society of the Netherlands. His reputation as a botanist was deservedly high, and several times his name was assigned to classes of plants, but that to which it is permanently attached is the remarkable insect-eating plant *Darlingtonia Californica*. He died at West Chester, Pa., April 23, 1863. He bequeathed his extensive herbarium and his scientific works to the Chester County Cabinet of Natural Science. The following is his epitaph, composed by himself twenty years before his death: "Plantæ Cestrienses, quas dilexit atque illustravit, super tumulum ejus semper floreant!"

DARTMOOR, a desolate region in the southern part of Devonshire, England, comprising altogether about 130,000 acres. It is named from the river Dart, which rises in a swamp in the centre of the moor. (See further description in article DEVONSHIRE, in the ENCYCLOPÆDIA BRITANNICA.) In 1809 the British government here constructed a prison, enclosing 30 acres with a double wall, and having seven buildings, for the detention of French prisoners. It was soon after also used for the confinement of sailors taken from American vessels, who, claiming to be citizens of the United States, refused to serve in the British navy. At the close of the war of 1812 about 6000 Americans were confined in this place, some having been there for five years. When they learned of the signing of the Treaty of Ghent, they expected a speedy release, and afterward in their impatience violated some regulations. The commandant, learning of the disobedience, and apprehensive of an attempt to escape, ordered the guard to fire upon the prisoners. Five were killed and

thirty-three wounded. This act produced great indignation in the United States, but is now believed to have been due to a misunderstanding. The prison has since been used for convicts, and over 1000 acres have been brought under cultivation by the inmates.

DARTMOUTH, a town of Nova Scotia, in Halifax co., on the E. side of Halifax harbor, and 1 mile from the city of Halifax. It is the seat of the provincial hospital for the insane; has a newspaper, 5 churches, graded schools, manufactories of skates, shovels, bolts, nails, and iron bridge-work, 2 iron-foundries, boiler-works, a sugar-refinery. It was founded in 1750, and incorporated in 1873. Population, 3786.

DARTMOUTH COLLEGE, the fourth in chronological order of the New England colleges, is situated at Hanover, N. H. It owes its origin, permanent organization, and character to the Christian philanthropy and executive force of Eleazar Wheelock, D. D., a Congregational pastor at Lebanon, Conn., widely known for his earnest piety and practical wisdom. After the Great Awakening of 1740–42, in which he bore a conspicuous part as "one of the first preachers," he became convinced that "the Indians were the proper objects of charitable attention," and resolved to devote half his time to them. In December, 1754, he took two Indian boys into his family, and in June following his friend Joshua More (usually, but incorrectly, spelled Moor) gave two acres of land, with a small house and shop, to found a school for Indian youth. "Moor's Indian Charity School" in Lebanon, Conn., was the germ of Dartmouth College. The London commissioners of the Society for Propagating the Gospel gave several annual donations of from £12 to £20 in aid of it, and there were six or seven other contributions from England during the first four years. Assistance was also received from Scotland, and the enterprise was commended in a circular issued by the leading ministers of Connecticut, and again by those of New Hampshire. In 1761 the General Court of Massachusetts granted £12 for educating six Indian youths, and afterwards the legislature of New Hampshire voted a grant of £50 a year for five years. Meanwhile, the number of Indian pupils had increased to 22, and with them were associated in 1762 three of English birth, who were to be prepared as missionaries to the tribes. Dr. Wheelock wished to educate Indians of both sexes, in order to introduce the home element into their life. The defect of his plan, as proved more conclusively by later experience, was in expecting that a few young persons, well educated away from their tribes, could on their return raise their countrymen to a higher life.

The Scotch commissioners of the Society for Promoting Christian Knowledge entered into an agreement in 1764 to aid the enterprise, and appointed a board of correspondents in Connecticut, thirteen in number. Dr. Wheelock's efforts to secure a legal incorporation either from the legislature or from the king, though commenced as early as 1758, had proved unsuccessful. In 1765, Rev. Nathaniel Whitaker and the Indian preacher, Samson Occum, visited Great Britain, and raised nearly £10,000, including a gift of £200 from King George III. The earl of Dartmouth, who had liberally assisted in raising these funds, was made chairman of a board of trustees who took charge of their disbursement. Meantime, Dr. Wheelock found it necessary to change his original plan, so that the missionaries should not require to be sent away to complete their education. Various considerations appear to have moved him to change his location with the growth of his plan. He wished to secure large tracts of lands for endowment and to be nearer the Indian tribes. He also considered the need of preachers for the new settlements. Moreover, the State of Connecticut was already provided with a college.

When his project of establishing a new college became known numerous offers were made him, and his parishioners in Lebanon earnestly entreated him to remain. He sent agents to Pennsylvania, Massachusetts, and New Hampshire, and to a congress of Indian tribes at Fort Stanwix, N. Y. The reports having been submitted to the trustees in England, they decided in favor of Northern New Hampshire, where the ministers, the legislature, and the royal governor all took an interest in the project. As the more definite determination of the site was left to Dr. Wheelock, he spent eight weeks in exploration, and then selected Hanover. The liberal offers of land in that vicinity, its situation in a fertile plain on a river "convenient for transportation," and the facility of "communication with Crown Point and with Canada," were all reasons that moved him in his choice. Gov. Wentworth had by this time procured a royal charter, in which the institution was incorporated as a college and named Dartmouth, in honor of the earl who was one of the most zealous promoters of the enterprise in Great Britain. In some respects the governor had modified Dr. Wheelock's draft, and had declined to avail himself of the latter's readiness to change the name to Wentworth. The charter, dated Dec. 13, 1769, was received early in the next year, and in August, Wheelock plunged into the unbroken pine forest. Thirty students soon followed him on foot, and his family came over almost impassable roads in a coach sent by a London friend. A "hut of logs, eighteen feet square, built without stone or brick, glass or nail," received the women, while his sons and students occupied "booths and beds of hemlock boughs" till the end of October. Dr. Wheelock personally superintended the clearing of lands and digging of wells, the erection of houses, a college building, saw-mill, grist-mill, malt-house, and barns, directed the studies of his pupils, and organized a church in the wilderness. His nearest neighbor was two and a half miles distant. Among the difficulties besetting the enterprise was occasionally that of procuring provisions. Four students—three of them from Yale—constituted at once a Senior class. The first commencement, held in 1771, was attended by the governor and a retinue of gentlemen who had made their way through the almost trackless forest from Portsmouth.

From this time the college went steadily forward, but the Indian element faded out. The supposed proximity of the site to those who were intended to be benefited proved delusive. The number of Indians under Dr. Wheelock's instruction before and after the removal to Hanover is stated at 150. Among them were Isaiah Uncas, apparently the son of the Mohegan chief, and the noted Mohawk, Joseph Brant, who at a later date sent his son also to the college. Few of the Indians remained through a complete course of education, and the principal service they could render was that of schoolmaster or interpreter. With the exception of Occum, the comparatively few preachers died in early life. The influence they carried back to their tribes was too isolated and destitute of concurrent agencies to work effectually. Above all, the rising disputes between Great Britain and the colonies, which culminated in the Revolution, had begun to agitate the Indian tribes almost from the foundation of the college, and

the missionaries were for more than ten years effectually excluded from the whole Indian country except that of the Oneidas.

Wheelock, worn out with care and toil, died in 1779, but not until he had given the institution the character of an ordinary American college. Of the *matériel* of the college as it existed in his day almost nothing remains. Its first edifice long ago disappeared, and its funds had been so far exhausted, while new supplies were prevented by the troubles of the Revolution, that soon after his death the whole property of the college would not have paid its debts. John Wheelock, his son and successor, nominated by him in accordance with the charter (and elected by the board), had been a member of the first graduating class, and had subsequently had five years of military life. He entered on his work with much activity; visited Europe to recover the Indian charity funds; raised money at home to erect Dartmouth Hall, which was begun in 1786 and is now standing; attended the legislatures of New Hampshire and Vermont and procured land-grants from each; was instrumental in securing the so-called Evans and Phillips professorships; erected a chapel and a building for Moor's Charity School, both now destroyed; and by land-sales extinguished much of the college indebtedness. He also gave instruction many years. His long administration of thirty-six years ended in his removal by the trustees and the famous lawsuit, "the Case of Dartmouth College." The original controversy was of long growth, primarily a question of administration, or rather of fundamental policy, but included secondarily an ecclesiastical element, as well, perhaps, as an educational bearing. Dr. Wheelock was by vote of the trustees "excused from hearing recitations." He then presented his case to the public, and in June, 1815, appealed directly to the legislature to interfere. The trustees, with two dissenting votes, thereupon removed him from office. The suit that arose is equally noted for the settlement of a great legal principle for the country and the opening to Daniel Webster of a field for his first national fame. In response to Wheelock's appeal and the recommendation of Gov. Plumer (in which Jefferson concurred) the New Hampshire legislature passed a bill revolutionizing the college. Its name was changed to "Dartmouth University," the number of its trustees increased from twelve to twenty-one, and their appointment transferred from their own body to the governor and council. A board of overseers was to control the action of the trustees. Dr. Wheelock was made president, with two professors. For two years the college and the university were running side by side, with keen rivalry but with courteous relations.

The college trustees refused to submit, and in 1817 brought an action, first in the court of common pleas, then in the superior court of New Hampshire, against W. H. Woodward, their former secretary and treasurer, to recover the records, treasurer's books, original charter, and college seal, then in his hands and retained by him in the interest of the university. It was ably argued for the college by Jeremiah Mason, Jeremiah Smith, and Daniel Webster, and for the defendant by George Sullivan and Ichabod Bartlett. The decision, delivered by Chief-Justice Richardson for the court, was against the college. An appeal was at once made to the Supreme Court of the United States, and was argued before the full bench in March, 1818, by Mr. Webster and Joseph Hopkinson for the college, and by William Wirt and John Holmes on the other side. The decision, for the college, was rendered in 1819 by Chief-Justice Marshall, with the concurrence of Justices Washington, Johnson, Livingston, and Story, and the dissent of Judge Duvall, Justice Todd being absent.

The case is celebrated as settling the inviolability, under certain circumstances, of chartered rights, even as against the infringement of legislative and judicial bodies. The issue, as stated by the chief-justice, was, that the legislature of New Hampshire had passed "a law impairing the obligation of contracts," and thereby violating the Constitution of the United States. He held it clear that here was a contract: an application to the Crown in 1769 to incorporate a literary and religious institution, to which large contributions were to be conveyed as soon as incorporated; a grant of the charter sought; and a conveyance of the property on the faith of that charter. "In this transaction every ingredient of a legitimate contract is to be found. It is a contract such as the Constitution protects—a contract concerning property, and that private property; not a grant of political power, a civil institution, or a portion of the public possessions, nor a matter in which the government of New Hampshire alone was interested, but the funds of a private eleemosynary corporation, in which the living trustees represent the deceased donors, a contract within the letter and spirit of the Constitution, which cannot be impaired without violating the Constitution." The question whether it was impaired by the act of the New Hampshire legislature was also answered in the affirmative, and characterized as a question on which "two opinions cannot be entertained." And, though the charter was granted before the formation of the present Government, the rights of property "remain unchanged by the Revolution." The important bearings and actual applications of this decision are beyond the scope of the present sketch. "That decision," said Chancellor Kent, "did more than any other single act proceeding from the authority of the United States to throw an impregnable barrier around all rights and franchises derived from the grant of Government, and to give solidity and inviolability to the literary, charitable, religious, and commercial institutions of our country."

When President John Wheelock was removed, Rev. Francis Brown, D. D., was elected in his place—a gentleman of excellent qualities and of great intellectual resources, which were strained to their utmost by the lawsuit and the straitened circumstances of the college. The difficulties were so great that at one time he was ready to surrender the control of the college to the State. He was worn out, and died after only five years of service. Rev. Daniel Dana, D. D., his successor, held the office but one year, and Rev. Bennett Tyler, D. D., six years; both of whom appear to have found the cares and labors too uncongenial and oppressive. During all this time of early struggle and embarrassment, however, the college was not only fairly supplied with students, but sent forth many men of great power and influence. Rev. Nathan Lord, D. D., LL.D., who followed President Tyler, was in many respects a remarkable man. He brought to the office great intellectual ability, sagacity, and discernment of character, gathered round him able professors, and brought the college on the whole to a high scholarly condition. A favorite measure of his, the abolition of all distinctions founded on scholarship, was continued through about thirty years of his administration, but abandoned after his retirement. His long presidency of thirty-five years was in its closing years some-

what clouded by a divergence of views between him and the public sentiment around, growing out of his millenarian opinions and his peculiar notions on slavery and the War of the Rebellion, which constrained him to resign his office in 1863. Rev. Asa D. Smith, D. D., LL.D., followed him, and did much to gain the sympathy and interest of the public to the college, to attract students, and to secure scholarship and other funds. After thirteen years he died exhausted by the arduousness of his labors, and was succeeded in 1877 by the present incumbent, Samuel C. Bartlett, D. D., LL.D.

To the original Dartmouth College there have been added—in 1797 a medical school, in 1852 a Chandler Scientific School, founded by Abiel Chandler, and in 1871 a Thayer School of Civil Engineering, founded by Gen. Sylvanus Thayer, who had been superintendent of West Point Military Academy. The latter was designed for a first-class engineering school; the Chandler Department or School for "instruction in the practical and useful arts of life," requiring only a common-school education in preparation for it. The New Hampshire College of Agriculture and the Mechanic Arts sustains but a quasi relation to Dartmouth College, having a minority of its board of trustees appointed by the college, and having the use of one public building in common with it.

Dartmouth College, by its history, location, and methods, has always had the good fortune to draw around it a large representation of young men in moderate circumstances and earnestly intent upon an education. These influences have impressed certain marked characteristics on the work of the college and its graduates. The college has furnished a remarkable proportion of teachers in educational institutions of every grade. It has been noted for the number of its alumni who have been eminent at the bar and on the bench. It has furnished a large number of faithful and laborious pastors and preachers, and has been well represented in the medical profession. Its graduates have done less in the fields of literature than might have been expected from their number without a consideration of other circumstances. But its entire record is eminently honorable, and the list sometimes given of responsible positions held by its graduates is long and remarkable. Among its prominent names in public life are those of Salmon P. Chase, Amos Kendall, Thaddeus Stevens, Levi Woodbury, Rufus Choate, Daniel Webster, and many others, judges, governors, Congressmen, and foreign ministers. Its list of medical graduates includes such men as Reuben Dimond Mussey and Edmund Randolph Peaslee. Among its literary men may be mentioned George Ticknor, George Bush, Thomas C. Upham, George P. Marsh, James Marsh, Caleb S. Henry, Samuel Hopkins, George Punchard, Joseph B. Felt, Charles D. Cleaveland, Alpheus Crosby, Henry Coleman. Its eminent teachers and preachers are too many to be enumerated, while its band of missionaries, led by such men as Goodell, Poor, and Temple, have aided in giving the gospel to Africa, India, Ceylon, Turkey, Persia, Syria, Japan, the Sandwich Islands, and the Indian tribes, and have aided in translating the Scriptures into the Japanese, Armeno-Turkish, and Hawaiian languages. The entire number of graduates of the college proper to the year 1890 was 6850. The Chandler School graduates numbered 249, those of the Thayer School 19, and of the Medical School 813.

The college has maintained a conservative character throughout its history. Its course of study adheres to a settled curriculum, but with fair allowance for optional and elective courses in the last two years; and it provides for those who choose to dispense with Greek the substitution of a larger amount of scientific studies and modern languages. And, though by its charter equally open to students of all religious views and connections, it was also by its charter placed originally in the hands of a board of trustees of whom one-half were Congregational clergymen in full sympathy with Dr. Wheelock. Since that time the majority of the board has been composed of men who represented the Congregational and Presbyterian churches, and the patronage largely, though by no means exclusively, from similar sources. The board of trust consists of twelve members (including the governor of the State for the time being), of whom eight must be residents of New Hampshire and seven must be laymen. The number of instructors in the college and associated institutions in 1889 was 48, and the number of students 455. (S. C. B.)

DARWIN, Charles Robert (1809–1882), an illustrious English biologist, was a grandson of Erasmus Darwin on his father's side, and of Josiah Wedgwood on his mother's, and son of Dr. Robert Waring Darwin. He was born at Shrewsbury, Feb. 12, 1809.

According to the admitted laws of heredity, Darwin should have felt a strong predilection for natural science; but his taste for its pursuit not only was slow of development, but for a time appeared not to exist. While attending Shrewsbury school, of which Dr. Butler (afterward bishop of Lichfield) was head master, he displayed no zeal in the fields, no energy in the laboratory, and left so neutral an impression as a student that no legends of those early days have been handed down. It was his father's wish that he should adopt his own profession, that of medicine; but the prospect of living the grim and dreary life of a practitioner did not please his fancy. While attending the University of Glasgow, for the purpose of studying medicine, he evinced some interest in natural history. The records of the Plinian Society show that in 1826 and the year following he read two papers, one on the ova of *Flustra*, in which he stated that he had discovered organs of motion. Yielding to his repugnance toward the practice of medicine, Dr. Darwin sent his son to Christ College, Cambridge, with the expectation that divinity would prove more attractive to him and that he would take orders; and at the university he met a strong and gentle man who was destined to exercise a controlling influence in forming his mind and moulding his destiny. This was Prof. Henslow, who filled the chair of botany. Darwin says that prior to meeting him the only objects of natural history for which he cared were foxes and partridges; but under his leadership the young man became an ardent collector, especially in entomology, the capture of an insect in the fens furnishing the first occasion on which his name appeared in print. He became so absorbed in the fundamental studies of natural science that he abandoned, if he ever seriously entertained, the intention of seeking ordination; and the charm of his intercourse with Prof. Henslow seems to have acted profoundly upon him in settling his dominant qualities, mental and social, and in finally shaping his career. The grateful words he has written of his friend and teacher have been reiterated of Darwin by those who had close personal intimacy with him. He writes of Prof. Henslow, "I never once saw his temper even ruffled He never took an ill-natured view of any one's

character, though very far from blind to the foibles of others. It always struck me that his mind could not well be touched by any paltry feeling of envy, vanity, or jealousy. With all this equability of temper and remarkable benevolence, there was no insipidity of character. A man must have been blind not to have perceived that beneath this placid exterior there was a vigorous and determined will. When principle came into play, no power on earth could have turned him a hair's breadth. . . . In intellect, as far as I could judge, accurate powers of observation, sound sense, and cautious judgment seemed to predominate. Nothing seemed to give him so much enjoyment as drawing conclusions from minute observation." The zeal and proficiency which Darwin displayed in every department of natural science gradually won him such distinction that when a naturalist was wanted to accompany Capt. Fitzroy on the surveying voyage of the Beagle, the opportunity was offered Darwin through the friendship of Prof. Henslow. At first his father objected to his availing himself of it, fearing that so thorough a change of life would dissuade him from entering the church, but he at length consented and Darwin sailed in December, 1838. During the voyage he suffered so severely from sea-sickness and encountered such prolonged hardship that his health was permanently injured, chronic dyspepsia holding him a life-long victim. In resisting its effects upon his temper it was fortunate that he was able to recall the gentle and amiable example of his university tutor. After marrying, Darwin selected a home at Down in Kent, where he spent his entire life, away from the annoyances and distractions of great cities and surrounded by the physical and moral environment which suited his scientific habits. Haeckel, who visited him, has given this brief and vivid picture of his home and its master: "In Darwin's own carriage, which he had thoughtfully sent for my convenience to the railway station, I drove one sunny morning in October through the graceful hilly landscape of Kent, that with the chequered foliage of its woods, with its stretches of purple heath, yellow broom, and evergreen oaks, was arrayed in its fairest autumnal dress. As the carriage drew up in front of Darwin's pleasant country-house, clad in a vesture of ivy and embowered in elms, there stepped out to meet me from the shady porch, overgrown with creeping plants, the great naturalist himself, a tall and venerable figure with the broad shoulders of an Atlas supporting a world of thoughts, his Jupiter-like forehead highly and broadly arched, as in the case of Goethe, and deeply furrowed by the plow of mental labor; his kindly mild eyes looking forth under the shadow of prominent brows; his amiable mouth surrounded by a copious silver-white beard. The cordial, prepossessing expression of the whole face, the gentle, mild voice, the slow, deliberate utterance, the natural and naive train of ideas which marked his conversation, captivated my whole heart in the first hour of our meeting, just as his great work had formerly, on my first reading it, taken my whole understanding by storm. I fancied a lofty world-sage out of Hellenic antiquity—a Socrates or Aristotle—stood before me." Others have borne testimony, equally explicit, to the simple and engaging personality of the man.

The foundation of Darwin's career as a scientist was laid during the voyage of the Beagle, which lasted for five years and during which he made copious notes of everything he saw. Well read in the literature of all branches of science, animated by the *Personal Narrative* of Humboldt, and trained by Henslow to habits of cautious and acute observation of the minutest phenomena in the organic and inorganic world, he was led to seek for himself a key to the mystery which Lamarck had left unsolved when he affirmed that the similarity of organic forms was to be explained by their derivation, and their diversity by their adaptation to the conditions of existence. His contemplation of what herein is left undefined—namely, the law by which both derivation and diversity may be accounted for—gradually crystallized into a single inquiry, How did species originate? and it was during the year 1834, when he was twenty-five years old, being "much struck with certain facts in the distribution of the organic beings inhabiting South America, and in the geological relations of the present to the past inhabitants of that continent," he conceived that "by patiently accumulating and reflecting on all sorts of facts that could possibly have any sort of bearing on the matter, some light might be thrown on the origin of species." He did not, however, at once disclose this object, which became from that time until his death almost the sole burden of his investigations, but contented himself with a modest epitome of his observations made during the voyage of the Beagle. This was entitled *Journal of Researches*, and appeared in 1839. Under the auspices of the Lords of the Treasury the special geological report of the voyage was published in three successive parts, *The Structure and Distribution of Coral Reefs*, in 1842; *Geological Observations on the Volcanic Islands Visited during the Voyage of H. M. S. Beagle, together with some Brief Notices of the Geology of Australia and the Cape of Good Hope*, in 1844; and *Geological Observations on South America*, in 1846. Of all his contributions to geology Prof. Geikie says that while they have not been epoch-making, "every one of them bears the stamp of his marvellous acuteness in observation, his sagacity in grouping scattered facts and his unrivalled far-reaching vision that commanded all their mutual bearings as well as their place in the economy of things." The most important part of his geological work has dealt with the forces within and under the earth, those that are effective in earthquakes and volcanoes, in the elevation of mountains and the subsidence of extensive areas of the earth's surface. Out of his geological notes taken on the Beagle he also contributed three papers to the *Transactions of the Geological Society;* one "On the connection of volcanic phenomena" (1840); a second "On the erratic boulders of South America" (1842); and a third "On the geology of the Falkland Islands." Of the earliest of his geological papers, that on the "Formation of Mould" (1840) is especially curious as showing his unlimited patience and his painstaking habit of reaching conclusions by personal observation. This subject interested him so much that in 1842 he deposited a layer of chalk on a patch of ground; watched it constantly until 1881, and then wrote the results; they are embodied in his last published work, *Vegetable Mould* (1881). Indeed so precise and unaffected were his methods of investigation that the passer-by, seeing the grounds and buildings around his home, would have taken him to be a gardener and cattle-raiser. Occasionally he made short excursions for study and recreation, and always brought back substantial evidence of industry; when he visited the Welsh district described by Buckland, he prepared a paper (1843), affirming his belief in the former presence of glaciers in Britain.

In 1851 and 1854 the Ray Society published Dar-

win's very important *Monograph of the Cirripedia*, two massive volumes, finely illustrated, preserving the results of several years of close inquiry. Meanwhile he had been assiduously accumulating facts in support of his theory of Natural Selection; and after nearly twenty-five years of slowly deepening conviction he ventured, after he had completed his fiftieth year, to make it public in a volume entitled *The Origin of Species* (1859). (See DARWINISM.) The work created a profound sensation throughout the scientific and non-scientific world. The fact that the theory of evolution was an old one was forgotten; and Darwin was assailed as the inventor of that, while many of those who perceived that he merely suggested the method by which that theory might be brought within the pale of speculative debate, carried it far beyond the limits which he with undeniable modesty and candor had himself prescribed. That he feared and regretted the disturbance it would effect in the domain of religion is shown by the deprecatory extracts from Whewell, Bacon, and Butler which precede the title-page, and by the delicacy and respect with which he met the attacks of those who accused him of promoting atheism. The *Origin of Species* was translated into most of the European languages; and the controversy it engendered continued with unabated vigor during the life of the naturalist, who never descended into the arena of the conflict except with a new collection of facts which seemed to sustain it. In addition to the volumes mentioned he published the *Orchids Fertilized by Insects* (1862); *Climbing Plants* (1865); *Variation of Animals and Plants under Domestication*, 2 vols. (1868); *Descent of Man* (1871); *Emotional Expression in Man and Animal* (1872); *Insectivorous Plants* (1875); *Fertilization in the Vegetable Kingdom* (1876); *Forms of Flowers* (1877), and *Power of Movement in Plants* (1881). He wrote many papers on minor phases of the great scientific issues of the day. (See DARWINISM.) The literary style of his works is so simple and pleasing that he has been read with as lively interest by those who could not accept his conclusions as by his disciples; and the generosity with which he assisted all who sought his aid, his eagerness to acknowledge the merit of the work of others, his silence under personal attack, the universally acknowledged sincerity and love of truth in his character and in his writings, secured the esteem of his contemporaries of all schools of scientific opinion. To the end of his life he continued his painstaking researches and elaborate investigations of the facts of nature. He died at Down, Kent, April 19, 1882, and was honored with interment in Westminster Abbey.

Darwin was ably seconded in his experiments and investigations by his sons; one of whom, Francis, a naturalist, has prepared a biography of his father. Another, George H., is professor of astronomy in Cambridge University. (M. F. S.)

DARWINISM, a doctrine in scientific philosophy first definitely elaborated by Charles R. Darwin, the eminent naturalist, whose life is sketched in the preceding article. It is the doctrine of "natural selection" in the "struggle for existence," through which results the "survival of the fittest," or those forms which are best adapted to the situation, a result which perpetuates the best modifications of an organic form, and leads progressively to improvements which in time amount to the origination of a form so changed that it may be denominated a new specific type. It assumes, therefore, and undertakes to establish, the older doctrine of the indefinite variability of organic structures, and hence the secular instability of specific and higher types, the derivation of all existing forms of organization from lower forms, and the possibility of indefinite organic improvements in the future. The improvements which it contemplates are, so far as the essence of the doctrine is concerned, relative rather than absolute. They are improvements in that kind of harmony with the environment which best promotes the well-being of the organism, and not necessarily an inherent perfection of the organism in itself. Certain changes in the environment may therefore be attended by changes in the organism which shall render it a more consummate structure; but other changes in the environment may be of a retrogressive character, and the responsive changes of the organism must cause it to recede from perfection. Since, however, the environment consists chiefly of conditions growing out of the progressive advances of the physical world toward a completer differentiation of its parts, changes of environment as a rule are attended by changes in organization which multiply the number of its relations, and constitute progress toward inherent perfection. The older doctrine assumed by Darwinism as a truth, and which the data of Darwinism tend strongly to confirm and establish, is the mutability of specific forms and their inferential derivation from one or more primitive forms. It is the doctrine of the derivative origin of species, in distinction from their separate creative origin. The still broader conception expressed by the term "evolution" embraces the derivative origin of organic forms, whether by natural selection or any other means, and, similarly, the origin of inorganic forms of matter and modes of being out of pre-existing states—a morphological conception expressed long ago in the formulation of the Leibnitzian *Principle of Continuity*.

The Darwinian conception, in the language of its founder, involves the operation of the following laws: "Growth with Reproduction; Inheritance, which is almost implied by Reproduction; Variability, from the direct and indirect action of the external conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and, as a consequence, to Natural Selection, entailing Divergence of Character and the extinction of less improved forms." (*Origin of Species*, Am. ed., p. 424.)

The term *Darwinism* has been loosely employed by various writers under the significations just indicated:

1. *Evolution*, or the derivation of all existing forms and modes out of older forms and modes.

2. *Lamarckism*, or the derivative origin of all organic forms (*Entwickelunglehre, Descendenztheorie*).

3. *Darwinism* proper, or the derivative origin of organic forms *by means of natural selection*—a restricted application of the principle of natural selection which other thinkers have legitimately extended into many other realms of inquiry (*Züchtungslehre, Selectionstheorie*).

I. DARWINISM proper. This is the aspect to which we shall chiefly confine the present discussion.

A. *Historical Notice.*—The "struggle for existence" has been going on before the eyes of all observers from the beginning of the world. The contemplation of the struggle would not, in itself, suggest it as a condition of the origination of new specific forms. The attentive study of it through a succession of generations might, however, reveal progressive changes which should demonstrate the variability of species and

prompt to the inference of a derivative origin for all species. Apart from the philosophic contemplation of the struggle for existence, common observation had shown the variability of specific forms within certain limits, and had led many, in the progress of the history of thought, to maintain that such variability is unlimited, and that consequently existing forms are merely derived. The recognition of the indefinite variability of species opened the way to the detection of the tendency of the struggle for existence, and the discovery in it of a means for promoting variations and eventuating in new specific forms. Thus the conception of gradual improvement through the continual survival of the fittest sprang up. This conception is the signal triumph of Darwin, and is the essential gist of Darwinism. The survival of the fittest had been often remarked by his predecessors. Aristotle (*Phys.*, ii., 8; *De Part. Anim.*, i., 8) and Plutarch (*De Plac. Philos.*, lib. v., cap. 19, 26) have recorded of Empedocles (500 B.C.) that he regarded organic forms as having come into existence by a method of survival and natural selection. Plants first sprang from the earth; from them came the separate animal organs, which joined themselves together by the attraction of love. At first many grotesque and monstrous combinations resulted, together with those which were harmonious and useful. The former perished, while the latter persisted and reproduced themselves. Epicurus (341 B.C.) adopted the Empedoclean doctrine as something quite in harmony with the dogma of fortuitous atomic arrangements. Lucretius (*De Rerum Natura*, i. 1020 *seq.*) says that many races of men have lived and perished, and those which survive have been protected by superior courage or strength, or other advantages; and he intimates, contrary to the teaching of Plato, that existing races have risen from a state of savagery.

Spinoza conceived the law of "self-preservation to be the determining force in things." Sir Matthew Hale, whose intelligence combined extensive observation in natural history with a philosophic apprehension of the deeper meaning of phenomena, wrote, more than two centuries ago, at considerable length, on the means by which nature restrains over-multiplication of individuals. "So among brutes, birds, fishes, insects," he says, "there is a continual invading and prevalence of the more powerful, active, and lively over the more weak, phlegmatic, and unactive natures; the bear, lion, wolf, dog, fox, etc., pursue the sheep, oxen, hare, coney, etc., and prey upon them: the like is evident among birds and fishes, and generally insects, being the weaker and more inconsiderable parts of nature." (*The Primitive Origination of Mankind*, 1677, p. 211.)

Erasmus Darwin, in his *Zoönomia* (1794)—especially XXXIX.—appears from the researches of Dr. Ernst Krause to have argued with clearness and force, and considerable fullness, the doctrine of the derivative origin of species many years before Lamarck treated the subject, and even to have enunciated definitely the principle of natural selection. Speaking of the use of the spur among cocks, and the jealous battles of these males with each other, he says: "The final cause of this struggle among the males seems to be that the strongest and most vigorous animal may propagate the species, which, by such means, shall be improved." This improvement may continue its progress through many generations. Similar views, and others destined to be argued with fullness and force by his grandson, are contained in his *Phytologia* and *The Temple of Nature*. (See a copious and appreciative memoir by Dr. Krause in *Kosmos*, February, 1879, pp. 397–424.)

The conception of natural selection was quite clearly enunciated by Dr. W. C. Wells in 1813, in a paper read before the Royal Society of London (*Trans. Roy. Soc.*, London, published in 1818). In some reflections on a curious physiological case, he remarks that all animals tend to vary to a certain extent, and that breeders, by availing themselves of this property, and by selecting, succeed in improving the domestic animals. "But what in such cases happens through art seems to me to work with equal efficiency, though more slowly, in the natural way, in the production of human races, which thus gradually become accommodated to the regions which they inhabit." In illustration he proceeds to explain how certain African races may have become dominant in consequence of some greater immunity from certain diseases.

The principle of selection was also fragmentarily stated in 1831 by Patrick Matthew in a work on ship-timber and tree-culture. Sir Charles Lyell also says, "Unhealthy plants are the first which are cut off by causes prejudicial to the species, being usually stifled by more vigorous individuals. . . . In the universal *struggle for existence* the right of the strongest eventually prevails." (*Principles of Geology*, 8th ed. 1850, p. 582).

Mr. Alfred Wallace, as early as 1855 (*Ann. and Mag. Nat. Hist.*, 1855), formally announced his belief in the theory of descent of species, and intimated that the manifest adaptation of certain varieties to their surroundings secured them the best chances of perpetuation. Later records show that Mr. Wallace did not stop at this stage of development, as we shall see.

Beyond all question Mr. Darwin was the first to work out with any adequate detail the significance of the principle of natural selection. While still attached to the *Beagle*, on her voyage around the world, he became convinced of the derivative origin of species, and began methodically to inquire by what means specific transitions were effected.

He has given us this information in a letter to Prof. E. Haeckel, written Oct. 8, 1864 (Haeckel's *Natürliche Schöpfungsgeschichte*, 119), rewritten from the German version in Prof. Oscar Schmidt's *The Doctrine of Descent and Darwinism*, p. 32, New York, 1875. See also *The Origin of Species*, Introduction.

The question occupied his attention from the time of his return in 1837 till 1842, when he first drew up some short notes. These were enlarged in 1844 to a "sketch of the conclusions which then seemed probable." This sketch was read by Dr. Joseph D. Hooker, and the purport of it was communicated to Sir Charles Lyell. The first part treated of the variability of organisms in the domestic and wild states. In the second chapter the writer considered specifically the variability of organic beings in a free state, the influence of natural selection, and the relation of domestic races to true species. But nothing was yet made public, and Mr. Darwin continued for fourteen years more to institute experiments and record his observations. That his aim was fixed and his convictions unchanged appears from a letter addressed to Prof. Asa Gray in September, 1857, in which, in six points, the fundamental principles of what is here styled Darwinism were laid down.

In February, 1858, Mr. Wallace addressed to his friend Darwin, from Ternate in the Moluccas, a letter

which loosed the spring that forced Darwin's conclusions before the public, and fixed the natal day of Darwinism. This letter treated of "the tendency of varieties to deviate indefinitely from the original type." It set forth, to Darwin's astonishment, the identical ideas which he had himself penned sixteen years before concerning the struggle for existence and natural selection, and illustrated them by a very similar method. Mr. Wallace requested his friend, if he found anything new or interesting in the paper, to show it to Sir Charles Lyell. Mr. Darwin, who of course placed the highest estimate on the value of Wallace's suggestions, hastened to request Sir Charles Lyell to publish the communication as soon as possible. Both Lyell and Hooker consented to this on the condition that Darwin would no longer withhold from publication his own memoir, which so many years before had become known to both of them. To this Mr. Darwin was disinclined through regard for his friend Wallace. Finally, however, he consented to place it in their hands with the request to use it freely as they might think best. Accordingly the *Journal of the Proceedings of the Linnæan Society* of London for August, 1858, contained communications setting forth the foregoing circumstances, and embracing the following documents: 1. An extract from Darwin's memoir (pp. 46–50). 2. Abstract of Darwin's letter to Prof. Gray, of Cambridge, Mass., dated Sept. 5, 1857 (pp. 50–53). 3. The communication from Mr. Wallace, as already mentioned (pp. 53–62). This is the true date of the birth of Darwinism, as we here employ the term. The following year, 1859, is, however, more commonly regarded as the natal year of Darwinism, because in this year appeared Mr. Darwin's first, greatest, and most important work upon the principle of natural selection, and the questions of variation and derivation so inseparably connected with it. The work bears the title: "*On the Origin of Species by means of Natural Selection; or, the Preservation of Favored Races in the Struggle for Life.*"

The work bears the date "Down, Bromley, Kent, Oct. 1, 1859." The first edition saw the light Nov. 24, 1859. The second appeared, unchanged, Jan. 7, 1860 (pp. ix. and 502); the third, enlarged, improved, and supplied with an introduction, in March, 1861 (pp. xx. and 538); the fourth, in 1866; a fifth, improved edition, in May, 1869 (pp. xxiii. and 596); a sixth—the seventeenth thousand—in 1872. Numerous editions have appeared in Germany, the first on July 5, 1862, by Brown. The best-accepted, and certainly the most sympathetic, translations of this and Darwin's other works have been supplied by Victor Carus. Two French, two Russian, one Dutch, one Italian, and numerous American editions had been published before 1870.

Mr. Darwin regarded it as merely a preliminary statement of conclusions accompanied by characteristic selections of facts, and he frequently apologizes for the absence of references and authentications for which space did not exist, promising a more extensive and complete work in which the details should be spread before the public.

The sequel, however, showed that a succession of partial publications would more satisfactorily meet the public want; and during the remainder of his life he sent forth, at convenient intervals, instalments of facts and conclusions bearing upon particular branches of the inquiry broached in his first volume.

The following are the most important productions of his pen in subsequent years:

1862.—*On the Fertilization of Orchids by Insects*, 365 pp., with numerous wood-cuts. "On the Two Forms or Dimorphous conditions in the species of *Primula*, and on their remarkable sexual relations."—*Jour. Proc. Linn. Soc.*, vol. vi. (*Bot.*), pp. 77–96. "On the three remarkable sexual forms of *Catasetum tridentatum*, an orchid in the possession of the Linnæan Society."—*Ib.*, pp. 151–157.

1863.—"On the thickness of the Pampas-Formation of Buenos Ayres."—*Jour. Geol. Soc.*, xix. pp. 68–71. "On the so-called auditory-sac of Cirrhipeds."—*Nat. Hist. Rev.*, pp. 115, 116. "Observations sur l'heteromorphisme des fleurs et ses consequences pour la fecondation."—*Ann. Sci. Nat.*, xix. (*Bot.*), pp. 204–255. "On the Existence of two forms of several species of the genus *Linum*, and on their reciprocal sexual relations."—*Jour. Proc. Linn. Soc.*, vii. 69–83.

1864.—"On the sexual relations of the three forms of *Lythrum Salicaria*" (1864).—*Ib.*, viii. 1865 (*Bot.*), pp. 169–196.

1865.—"On the Movements and Habits of Climbing Plants" (1865).—*Ib.*, ix. 1867 (*Bot.*), pp. 1–118. Also as a separate work, of which a second edition appeared in 1875.

1866.—"Note on the Common Broom" (*Cytisus scoparius*), (1866).—*Ib.*, ix. 1867 (*Bot.*), p. 358. "On the specific difference between *Primula veris*, *vulgaris*, and *elatior*, and on the hybrid nature of the common Oxlip, with supplementary remarks on naturally produced hybrids in the genus *Verbascum*" (1868).—*Ib.*, x. pp. 437–454, 1869 (*Bot.*)

1868.—*The Variation of Animals and Plants under Domestication* (vol. i. pp. viii. and 411, with 43 wood-cuts, vol. ii. pp. viii. and 486). American edition (Orange Judd & Co.), with preface by Prof. Asa Gray, a special preface by the author, and sundry corrections and additions not in the English edition, appeared in 1868. Another American edition by D. Appleton and Co. "On the character and the hybrid-like nature of the offspring from the illegitimate union of Dimorphous and Trimorphous plants" (1868).—*Jour. Proc. Linn. Soc.*, x. 1869 (*Bot.*), pp. 393–437.

1869.—"Note on the Fertilization of Orchids."—*Ann. and Mag. Nat. Hist.*, iv. pp. 141–159.

1870.—"Note on the Habits of the Pampas Woodpecker (*Colaptes campestris*)."—*Proc. Zoöl. Soc.* (p. 705, 706).

1871.—*The Descent of Man and Selection in Relation to Sex*, 2 vols. (2d. ed. 1875, Amer. ed., in one volume, 1877, 688 pp.).

1872.—*The Expression of the Emotions in Man and Animals* (304 pp., ninth thousand, 1875; Amer. ed. 1873).

1873.—"On the origin of certain instincts."—*Nature*, vii. pp. 417, 418. Also other brief communications. "On the males and complemental males of certain Cirrhipeds, and on rudimentary structures."—*Nature*, viii. pp. 431–433.

1875.—*Insectivorous Plants*, 462 pp., with illustrations. "Perception in the lower animals."—*Zoölogist*, viii. pp. 3488, 3489.

1876.—*The Effects of Cross and Self-Fertilization in the Vegetable Kingdom* (12 mo., 182 pp., Amer. ed. 1877).

1877.—"Biography of a little child."—*Mind*, pp. 285–294. *Different Forms of Flowers and Plants of the same Species.*

1881.—*The Power of Movement in Plants. The Formation of Vegetable Mould through the Action of Worms, with Observations on their Habits; Transactions of the Linnæan Society* for Dec. 6; Posthumous paper on *Instinct.*

These publications are almost exclusively amplifications of the store of facts with which the doctrine of the "Origin of Species" had been already wonderfully enriched. The application of these doctrines to man was a step beyond any position conspicuously taken in the first work, and the hypothesis of *Pangenesis* was the result of later reflection. We thus discover how sound and enduring became the results, which for their maturity had demanded no less than a fifth of a century.

On the extraordinary character of these works for unity of [illegible], manliness of statement, [illegible] force, we should feel [illegible] to [illegible] were it not a duty to

confine ourselves to a concise statement of facts. The esteem which his life and life-work inspired is, however, a phenomenal fact which ought to be recorded; and we choose, in doing this, to cite a passage from an English biographer:

"The greatness of Mr. Darwin as the reformer of biology is not to be estimated by the fact that he conceived the idea of natural selection; his claim to everlasting memory rests upon the many years of devoted labor whereby he tested this idea in all conceivable ways: amassing facts from every department of science, balancing evidence with the soundest judgment, shirking no difficulty, and at last astonishing the world as with a revelation by publishing the completed proof of evolution. Indeed, so colossal is Mr. Darwin's greatness in this respect that we doubt whether there ever was a man so well fitted to undertake the work which he has so successfully accomplished. For this work required not merely vast and varied knowledge of many provinces of science, and the very exceptional powers of judgment which Mr. Darwin possessed, but also the patience to labor for many years at a great generalization, the honest candor which rendered the author his own best critic, and last, though perhaps not least, the magnanimous simplicity of character, which, in rising above all petty and personal feelings, delivered a thought-reversing doctrine to mankind, with as little disturbance as possible, of the deeply rooted sentiments of the age." (*Nature*, xxvi. 5, 1882.)

B. *Natural Selection in the Organic World.*—With this sketch of older opinions on the distinguishing conception of Darwinism, we shall endeavor now to present a logical exposition of Darwinism in its subject-matter, together with the antecedent principles which it both implies and tends greatly to establish. In doing this it seems best not to confine ourselves strictly to conceptions formally enunciated by Darwin, but to notice, in due connection, the criticisms, exceptions, qualifications, and additions offered by other students and thinkers. We shall thus get, it is to be hoped, a compact and methodical apprehension of Darwinism as it exists in its latest phase. Let us endeavor thus to bring the different moments of Darwinism into some systematic presentation.

Darwinism embodies three distinct implications—variability, heredity, and selection. We shall consider each in order.

1. *Variability.*—The susceptibility of variation must be a condition provided in the nature of the organism. The phenomena may be regarded as the results of perturbation in the action of the law of heredity. Heredity is centripetal; variability is centrifugal. What are the causes which deprive heredity of supreme control? And may the effects of these causes be accumulated indefinitely?

(1) *Inception of Variations.*—Extended observations show (Darwin: *Animals and Plants under Domestication*, ii. ch. xxii., xxiii.) that variations take place under various conditions, but a large class of them may be generalized under the expression: "Discord with the Environment." The great influence of this sort of discord was shrewdly apprehended by de Maillet and presented with amplitude of argument by Lamarck; but Darwin has surpassed his predecessors in copiousness of facts and clear discernment of their import. Discord with the environment includes the principle of rivalry among individuals, the principle of progress through antagonism, and the great principle of the struggle for existence. (*Der Kampf ums Dasein.*)

(a) *Conflicts between Individuals.*—This is one of the most familiar forms of discord with the environment. The fellow-existences of an organic being constitute an environment; competition arises for the possession of the same favorable conditions; and a rule of warfare and extermination is established, very much as Hobbes conceived it. In the prosecution of this warfare the functional equilibrium of the organs is destroyed. Those powers best suited for waging the conflict successfully are kept in most constant action, dormant and potential powers are called into use, and some of those powers in full play, in a condition of undisturbed existence, find restricted opportunity for exercise. Under these constraints and restraints certain parts of the organism experience abnormal exigencies which determine increased or diminished nutrition and increased or diminished vigor and development, and a changed relation of volumes and strength in the several parts. Thus variations may be initiated and developed in individuals. How these become perpetuated and augmented through successive generations will be afterward shown.

One aspect of this conflict between individuals is seen in the state of universal warfare in the animal kingdom, and another in the struggles among individuals of the same species. Where a species is gregarious the contest for the most favorable conditions of existence may be largely limited to the individuals of the species. This is especially the case where a single species monopolizes a certain district. The range of the conflict is a narrow one also in the case of competing progeny of the same parents, or the young in general of the same species. The exigencies arising must impress themselves more indelibly on the plastic organism of the young, and must more frequently determine changes in the relations of parts in the organism.

(b) *Conflicts with Physical Conditions* (*Animals and Plants under Domestication*, ii., ch. xxiii.).—All changes in the physical environment involve changed efforts in the organism to maintain the existence of the individual. Supposing the organism previously adjusted to the physical environment, all changes in the latter must create new exigencies for the former. Thus the previous balance of the organic activities will be destroyed; certain efforts must become more intense, and others perhaps less so; and thus, as before, a changed ratio of the organs, and of the parts in the same organ, will be established. In short, the structure will be changed—not by any absolute additions or subtractions, but by the changed ratio of development of parts.

Now the physical environment is subject to a variety of changes, some sudden and irregular, others slow, progressive, and secular. Changes in the cosmical conditions of the earth have been in progress ever since organic life has had existence upon its surface. Thus the constitution of the air has changed; certain land situations have been elevated and others depressed; the depth of seas has varied; the ratio of land and water has changed. When such changes have been cataclysmic or destructive, and as far as, at any epoch, they have been so, no changes have been impressed upon the organisms of individuals; though even then the restoration of habitable conditions would invite immigration, and the commencement of a struggle to establish harmonious relations with new surroundings. But as there are reasons for believing the greatest changes to be but aggregates accumulated through ages, each individual in its lifetime must have re-

ceived some impression far short of a destructive one, which determined such changed ratio of physiological activities as to develop some structural deviation from the type of its parents. The amount of deviation which, in the course of a million years, might be aggregated by a set of progressive terrestrial changes, always of the same tenor, may be easily conceived as all which fills the interval between lowest and highest organic beings. Such a cause of variation is more readily admissible than more energetic and more rapidly acting causes, since we observe that the organism yields more willingly to a gentle action than to a violent one.

But climatic and chorographic vicissitudes of a more spasmodic character, even though perhaps connected with secular terrestrial changes, have more conspicuously impressed organization. It is quite well understood that during the last geologic period important changes have taken place in the temperatures of certain regions, in the extremes of temperature and in the distribution of moisture to them. By the erosion of barriers waters have been drained; by the introduction of sediments seas and lakes have grown shallower or even become displaced. By such changes the local precipitation has been diminished, the vegetable growths unbalanced in their ratio to each other, some exterminated and some new ones introduced, and thus the food-supplies for all vegetable-feeding animals in the same ratio changed. Some species of animals may thereby have perished, other species have been introduced by immigration, and the aptitudes of the old endemic species slowly changed, as the circumstances demanded, by the augmentation of the efficiency of those structures best suited to maintain individual existence. Mr. Darwin's works teem with pertinent illustrations of these general statements, and numerous other writers have added to our store of facts. Changes in the depth of water have had much to do not only with the hydrostatic pressure experienced by aquatic animals, but in the supplies of light admitted to them. The influx of rivers in new situations, or the formation of bars or ridges across the mouths of bays, have diminished the salinity of portions of the sea and brought changed necessities to its inhabitants. Migrations have given rise to important changes in physical environment. The migrant finds itself probably in new surroundings, and begins immediately to feel their influence. If added to the fauna of the region arrived at, the old fauna is not only aroused to new conflicts, but portions of it must probably be destroyed or expelled. Then the relations of the fauna to the flora are changed, and the flora feels the reaction. A changed flora invites new birds and new insects, and these bring new factors to bear upon the immigrant fauna. Similarly the region abandoned experiences a changed relation of fauna and flora, and the change reacts on the flora and ultimately on the old and the incoming animals of the region. These are now elementary conceptions in the theory of variations.

A changed relation to the environment, even when no changes take place in the latter and no proper migration of individuals takes place, would be experienced during the gradual extension of a species over wider regions or the prolonged residence of the same species, however introduced, in districts geographically remote or chorographically diverse from each other. These phenomena have been carefully studied in the United States. The results of late investigations tend to show that very many of the animal species characterized in the earlier settlement of the country by naturalists of the standing of Rafinesque, Lesueur, Bonaparte, Audubon, De Kay, and even later investigators down to the earlier labors of S. F. Baird and L. Agassiz, are merely geographical varieties. Prof. Baird himself, now the honored secretary of the Smithsonian Institution and United States commissioner of the fisheries, was one of the first to point out the influence of geographical position (*Amer. Jour. Sci.*, II., xli.); and he formulated certain laws under which the variation from point to point exists. Researches in this direction by J. A. Allen (*Proc. Bos. Soc. Nat. Hist.*, vol. xv., p. 156; *Radical Review*, vol. i., No. 1, May, 1877), and by Robert Ridgway (*Amer. Jour. Sci.*, III., iv., 454, Dec., 1872, and v., 39, Jan., 1873), have resulted in the disclosure of other laws regulating the longitudinal and latitudinal distribution of birds and mammals. The result is that the number of accepted species of these classes has been much reduced. Similar results have been accomplished in the study of molluscs by Binney, Bland, Stearns, Cooper, Lewis, Tryon, and Weatherby, and in that of insects by Edwards, Packard, Walsh, Scudder, and others.

The special point to make in this connection is that the disturbance of the statical equilibrium (if it ever completely exists) between organization and environment, between fauna and flora, and between different species of the fauna or the flora, is perpetually creating new emergencies, which call certain powers into intenser action and throw others into a state of relative disuse, and by such means change the volumetric and sthenic ratios among the parts of the organism of the individual.

This conflict with physical conditions exerts its most important influence upon young offspring, upon the unborn embryo, and upon the circumstances under which the powers of parentage arise, develop, and come into activity. Well-fed and healthy individuals will develop the most potent parent cells. "I am strongly inclined," says Darwin, "to suspect that the most frequent cause of variability may be attributed to the male and female reproductive elements having been affected prior to the act of conception." But whatever the vigor of the parentage, starvation, disease, or hardship during the gestative period will leave its record upon the embryo. Whatever the vigor of the young offspring, subsequent hardships may determine a puny growth and maturity. In any of these stages a changed bias may be imparted to the organism and some new variation may be inaugurated.

Such facts have led, during the history of discussion on the mode of derivative origins, to various suggestions as to the way in which embryonic history may have been impressed, not alone by the environment, but by any other influence, known or unknown. The author of the remarkable work on the *Vestiges of the Natural History of Creation* (third edition, 1845; *Sequel* to the same, 1846) suggests, with great reason, that *prolonged embryonic development* might be the cause of the attainment of an advanced status. Since the embryo, as had been shown by Von Baer, R. Owen, L. Agassiz, and others, passed through stages which figured successive grades of organic structure, an extraordinary prolongation of the period might bring it to a structural stage in advance of that reached by the parents. Quite analogous was the suggestion of Alph[illegible] *Boston Soc. Nat. Hist.*, I., pt. ii., 1[illegible], Hyatt: *The Evolution of the Cepha[illegible]* 122–7, 145–9, and *Genera of Fo[illegible] Soc. Nat. Hist.*, xxii.

1884. Compare also Hyatt's *Embryology of the Fossil Cephalopods of the Museum of Comparative Zoölogy, Cambridge*) that the same result would be attained by an *acceleration* of embryonic development without a prolongation of the period. Prof. E. D. Cope, in view of occasional relapses in the grade of structure, completed the series of suggestions in this direction in recording the fact that *retardation* of development, in addition to acceleration, would furnish us with a physiological explanation equally of improvement and deterioration of type ("Origin of Genera," *Proc. Acad. Nat. Sci.*, Philadelphia, Oct., 1868; "The Hypothesis of Evolution," *Lippincott's Magazine*, 1870, and *University Series*, New Haven, 1873; "The Method of Creation," *Amer. Naturalist*, March and April, 1880. See also his *Synopsis of Cyprinidæ of Penn.*, 1866, and numerous other papers.) Cope maintained also that most structures are *not* adaptations to the environment. Somewhat in a different direction is the theory of *heterogeneous generation* propounded by Prof. A. Kölliker: (*Ueber die Darwin'sche Schöpfungstheorie, ein Vortrag*, Leipzig, 1864; *Morphologie und Entwickelungsgeschichte des Pennatulidenstammes, nebst allgemeinen Betrachtungen zur Descendenzlehre*, Frankfort, 1872). "The fundamental conception of this hypothesis," he says, "is that under the influence of a general law of development the germs of organisms produce *others different from themselves*. This might happen: (1) By the fecundated ova passing in the course of their development, under particular circumstances, into higher forms; (2) By the primitive and later organisms producing other organisms without fecundation, out of germs or eggs (Parthenogenesis)." The first mode of variation is supposed to be quite analogous to what we actually witness in cases commonly known as "alternation of generation." There is, however, this fundamental difference, that in alternate generation a cycle of three or more terms returns to the starting-point, while Kölliker's theory supposes the first term not to be reproduced, but the intermediate term to become endowed with sexual properties and to reproduce itself only. Earlier than Kölliker's speculations, however, were those of Prof. Theophilus Parsons (*On the Origin of Species, Amer. Jour. Sci.*, II., xxx., p. 1, July, 1860), who conceived that divergence of organic forms might result simply from the occurrence of "extraordinary births," through homogeneous generation. "It is always possible," he says, "that offspring may be born differing as much from their parents and kindred in the way of gain, of advantage and improvement, as we know that offspring have differed in the way of loss, of hindrance, and of degradation." A view almost identical in this respect was independently propounded by Prof. Richard Owen in 1868 (*Anatomy of Vertebrates*, ch. xl.); though Prof. Owen, in common with Lamarck, Huxley, and others, holds also to the existence of an inherent tendency to change, irrespective of circumstances.

(c) *Hybridity.*—It is now generally admitted that this is an actual condition of some specific variations, as was maintained by Lamarck. Mr. Darwin discussed the subject at some length (*Origin of Species*, ch. viii.), but so great are the obstacles to the attainment of certainty that, though he cited some cases of fertile hybridity which we hold to be good, he showed the extraordinary disinterestedness to conclude that hybridity ought perhaps to be omitted from the list of variative conditions among animals. "I doubt," he says, "whether any case of perfectly fertile hybrid animals can be considered as thoroughly well authenticated." He nevertheless proceeds to state the case of the hybrid of the common and Chinese geese, and even cites the fact that "whole flocks of the fertile hybrid are kept in various parts of India, and kept for profit, where neither pure parent species exists." This case has since been more certainly established by abundant additional evidence (*Nature*, xxi., 207, Jan. 1, 1880; *Kosmos*, April, 1880, p. 77). It is paralleled, however, by the fertile hybridity of the common and Muscovy ducks, as demonstrated in Mt. Auburn Cemetery, Cambridge, Mass. (T. M. Brewer, *Proc. Bos. Soc. Nat. Hist.*, Jan. 21, 1874). Another case similarly turned to economical advantage is the fertile hybridity of the European hare and rabbit. The hybrid posterity are described by official authority as possessing great vigor and a delicacy of flesh which renders them superior for food purposes, to either of the original species (Gindre, *Bull. de la Soc. Imp. Zoöl. d'Acclimation*, 1870, 659–67. Hæckel has named this hybrid *Lepus Darwinii*). It is also maintained that fertile hybridity is attainable between the goat and steinbock, the goat and sheep, the various species of the genus *Bos* (including the zebu), the fox and dog; and the dog and wolf. (See Von Tschudi: *Thierleben der Alpenwelt*, 555, 413; C. Vogt: *Köhlerglaube und Wissenschaft*, 56, 67, 60, and *Lectures on Man*, 416, 417; Haeckel: *Natürliche Schöpfungsgeschichte*, 132; C. Darwin: *Animals and Plants under Domestication*, i., 35, 39, 106, etc.) As to the latter little doubt can be entertained, since the Esquimaux and other peoples practise the crossing of their dogs with feral wolves. These being some examples among domestic and bulky animals, there is much room for the opinion that fertile hybridity may be rather a common occurrence among the thousands of inconspicuous and less differentiated species which populate the world. As to plants, the fact of fertile hybridity has long been fully recognized by nurserymen and botanists, as may be seen by referenee to the writings of Mr. Darwin, or to any of the local floral manuals. (On this subject see A. de Candolle: "Etude sur l'espèce à l'occasion d'une revision de la Famille des Cupulifères," *Bibliotheque Universelle*, Nov., 1862; and Naudin: "Hybridity in the Vegetable Kingdom," and "On the Nature of Hybridity and Variability in Plants," *Comptes Rendus*, Sept. 27 and Oct. 4, 1875.)

Something depends in this discussion on the conception entertained of the species. Formerly, when fertile hybridity was shown possible in any given case, it used to be claimed that the two species were really one. And again, infertile hybridity, and especially infertile crosses, used to be assumed as evidence of distinctness of species. Mr. Darwin has shown, however, that infertility of crosses or hybrids bears only a remote and indirect relation to the affinity of the forms crossed. Moreover, when we ask ourselves in the light of derivative doctrine, what can be understood by a species? we perceive that discussions of hybridity can have no bearing on questions of species. This is the more apparent since the discovery of the regular habit of mutual interfertilization among the different species of many different genera of plants, and even among different individuals of many hermaphrodite animals.

(d) *Reaction of Male upon Female Parent.*—Mr. Darwin has collected numerous facts showing the power of the pollen to modify not only the germ of the mother plant but also the parts contiguous to it

(*Animals and Plants under Domestication*, i., ch. xi.; ii., 437). This action is seen not alone when the pollen comes from a plant of the same species, but also in crossing with different species. This principle extends to the animal kingdom. A female that has produced offspring by a given male transmits some peculiarities of this male to all her other offspring by other males. This curious fact is authenticated by considerable observation. Quite analogous with this mode of reaction is that of a bud or graft of one species of plant introduced into the organism of another species. Many cases of this kind have been collected by Mr. Darwin. (See Burdach: *Traité de Physiologie*, ii., 243; *Bulletin de la Société d'Anthropologie*, tome i., p. 291.)

(c) *Morphological and Unexplained Variations.*—It is well known that variations among plants and animals frequently arise in a manner which, so far as we perceive, is entirely capricious. Mr. Darwin says, "We are profoundly ignorant of the causes producing slight and unimportant variations" (*Origin of Species*, Am. ed., 176). We cannot refer them to the influence of the environment nor any other known cause. A remarkable case of this kind was the Ancon breed of sheep. The well-known "sports" of the nurseryman must generally be placed here. Very many structures now useful to their possessors must, in their incipiency, for many generations, have been functionally useless, and yet they continued to develop. The phenomena known as dimorphism and trimorphism, particularly among plants, will have to be referred to this category. It is known that many species of plants are of two varieties in the wild state, one bearing colored flowers and the other white. *Viola cucullata*, with ordinary violet flowers, not unfrequently exhibits a plant with flowers variegated. (See Mr. Darwin's numerous papers on phenomena of this class.) The nectarine sprang from the peach, after the latter had been cultivated for thousands of years, under all conceivable circumstances, without exhibiting any such variation. Among Lepidoptera, dimorphism is in some cases a seasonal character, and, as Dr. Aug. Weismann insists, purely morphological, excepting in case of mimicry and protective uniform coloring. (*Studies in the Theory of Descent*, with Notes and Additions by the Author. Translated and edited with notes by Raphael Meldola, etc. 2 vols., 8vo., pp. 729, London, 1882. Views on dimorphism are reproduced in *Nature*, xxii., 141). The inapplicability of the principle of usefulness to certain classes of variations was first distinctly urged by Nägeli (*Entstehung und Begriff der Naturhistorischen Art*, Sitzungsberichte der Bairischen Akad. der Wissensch. 1865). Some naturalists, like Cope and Mivart, go so far as to affirm that most organic modifications are not adaptive; and most agree that there exists a large residue which do not arise on the principle of harmony with the environment.

(2) *Correlation of Variations.*—Mr. Darwin has called attention to the fact that when, under any conditions, one part or organ assumes a variant character, some other part, perhaps a structurally homologous or functionally correlated part, assumes correspondingly a variation (*Animals and Plants under Domestication*, i. 207, ii. 387; *Origin of Species*, Am. ed., 130). Thus, when the bird-fancier succeeds in elongating the beak of the pigeon, the tongue becomes elongated, though sometimes in greater or less degree. So the elongated nostril slit becomes more elongated and the length of the eyelids increased. Similarly the wings and tail of the pigeon tend to undergo a correlated variation. So, also, "when the feet are much feathered, the roots of the feathers are connected by a web of skin, and, apparently in correlation with this, the two outer toes become connected for a considerable space by skin." The number of cases and forms of correlated variations cited by Darwin in his works shows that correlation is a widely influential law in the inception of variations from whatever cause. In the contrary direction, the abortion of the visual organs in cave animals is accompanied by increased development of the organs of palpation.

(3) *Augmentation and Diminution of Variations.*—In considering the circumstances of the inception of variations we were led to conceive the variation rather as a changed relation of the old structures than the addition of any new structure, though we admit that in many cases the old structure may not yet have emerged into a state of functional or even distinctly structural existence, and may even have existed only as an undeveloped, prepotent, morphological element. But that it existed essentially and materially is manifest from the general principle of continuity at the foundation of derivative doctrine. Its development into a changed condition is therefore only an effect of increased *use* either of the organ or of the nutritive instrumentalities which sustain its life and activity. Mr. Spencer truly says: "Adaptive change of function is the primary and ever-acting cause of that change of structure which constitutes variation." The augmentation of the variation is only a continuance of the work begun in its inception. Use promotes augmentation. The illustrations of this principle are familiar. On the contrary, disuse promotes diminution, as the blind eyes of cave animals testify. The functional uselessness of the wings of the penguin, the ostrich, the loggerhead duck, and the apteryx, at least for purposes of flight, is believed to have resulted from the lack of necessity for their use. (Yet it might, on the other hand, be reasonably conceived that such wingless forms represent the phylogenetic transition from the wingless reptile.) Of 550 species of beetles inhabiting Madeira, 200 "are so far deficient in wings that they cannot fly," and this is because individuals little addicted to flight have been for thousands of generations least likely to be blown out to sea and destroyed. The whole class of so-called "rudimental organs," excepting those of a sexual character, has resulted from the cessation of demands for use, followed by abbreviations, atrophy, or abortion; while those of a sexual character depend on similar conditions in one sex. Most of the examples of the class just cited illustrate not the amount of variation possible to be induced in single individuals, but the total amount accumulated under continued influences during many generations, and belong more appropriately under the head of "Selection."

2. *Heredity and the Conservation of Variations.*—(Darwin: *Origin of Species*, Am. ed., 18, 103, etc.: *Anim. and Plants under Domestic.*, ii., ch. xii.–xiv.; Spencer: *Biology*, i., ch. viii., Am. ed., p. 238; Ribot: *Heredity; a psychological study of its phenomena, laws, causes, and consequences.* Translation, New York, 1875: Galton: *Hereditary Genius, an inquiry into its laws and consequences*, 8vo., 390 pp., London, 1869.)

The remarkable organic law under which the characters of the parent reappear in the offspring is the conservation of any variation induced in

the individual, and the extension of it to numerous individuals. Those influences exerted on the procreative powers of the parent, or upon the embryo during its development, and which resist to a greater or less extent the transmission of identity, are not factors in the law of inheritance, but perturbations of it. Inheritance is effectuated by means of reproduction. We generally recognize three forms of reproduction, sexual, gemmiparous and fissiparous. The asexual forms are commonly regarded as fundamentally distinct from the sexual, but Mr. Darwin thinks the distinctions are not fundamental (*Animals and Plants under Domestication*, ii., ch. xxvii., Pt. i.). Sexual reproduction and heredity are laws common to all biotic existence; and neither in the comparison of higher and lower animals, nor in that of animals and plants, do we discover any essential difference in the nature of the generative action. Inheritance extends to all the departments of the being's nature—its material organism, its moral faculties, its emotional susceptibilities, its instincts, and its intelligence. This is the view which must be held on the ground of derivative doctrine.

The phases of heredity may be generalized as three:

(1) *Direct heredity*, or the transmission of parental characteristics to immediate offspring. The phenomena present many interesting aspects and suggestions which may be studied in the works of Darwin, Ribot, and others.

(2) *Reversional heredity or atavism*, which is the development of the physical or psychical qualities of remoter ancestors. In the general sense it is simply direct heredity repeated one or more times. The term is, however, commonly understood to signify the development of some characteristic of an ancestor more strongly than it existed in the immediate parent. The phenomena are full of interest, but they do not need to be cited in this connection.

(3) *Collateral heredity*, or development of characteristics of a relative of a remote generation but not standing in the direct line of descent. Thus an individual may possess a resemblance to an uncle or aunt, great-uncle or great-aunt. While many authorities have pronounced such resemblances fanciful or accidental, there is no reason to doubt that they are cases of real heredity, and constitute merely a phase of atavism. The peculiarity has simply descended from some remoter ancestor in which the two genealogical lines converge.

The modern discussion of the phenomena of derivation has presented in a very clear light the importance of the problem of the mechanical explanation of heredity. Several important theories have been advanced, all of which agree in supposing some ultimate organic unit to pervade the organism, to be capable of indefinite multiplication, and to be transmissible to a new being through the male and female elements in the act of generation.

(1) *The Hypothesis of "Physiological Units."*—Mr. Spencer (*Principles of Biology*, i., pt. ii., ch. x., Am. ed., p. 253 *seq.*, 277 *seq.*) supposes the existence of "physiological units" having a complex atomic constitution, but nevertheless almost inconceivably small. These are continually thrown off from all parts of the organism, and find within it the conditions of their existence. They are capable of conjugation and reproduction. They are transmitted from generation to generation; and the potency of the sexual elements depends on their serving as "vehicles" for the transmission of "these highly plastic units." "In the fertilized germ we have two groups of physiological units slightly differing in their structures. These slightly different units severally multiply at the expense of the nutriment supplied to the unfolding germ—each kind moulding this nutriment into units of its own type. Throughout the process of evolution, the two kinds of units, mainly agreeing in their polarities and in the form which they tend to build themselves into, but having minor differences, work in unison to produce an organism of the species from which they were derived, but work in antagonism to produce copies of their respective parent organisms. And hence ultimately results an organism in which traits of the one are mixed with traits of the other."

(2) *The Hypothesis of Pangenesis.*—Mr. Darwin (*Animals and Plants under Domestication*, 1868, vol. ii., ch. xxvii., pt. ii., Am. ed., p. 448 *seq.* With ampler statement and some modifications in 2d. ed., 1875, vol. ii., p. 369 *seq.*) has been led to suggest the following hypothesis: (1) That the cells of the organism "throw off minute granules or atoms which circulate freely through the system, and when supplied with proper nutriment multiply by self-division, subsequently becoming developed into cells like those from which they are derived." (2) That these so-called gemmules collect together from all parts of the body and compound the sexual elements, and their development in the next generation forms a new being. But they are also capable of remaining dormant until transmitted to some remoter generation and then developed. (3) That their development depends "on their union with other partially developed cells or gemmules which precede them in the regular course of growth." (4) That "the gemmules are thrown off by every cell or unit not only during its adult state but during every stage of development of every organism." (5) That the gemmules "in their dormant state have a mutual affinity for each other, leading to their aggregation either into buds or into the sexual elements."

Darwin and Spencer have both shown in detail the application of their hypotheses to the phenomena of genesis, variation and heredity.

Mr. Darwin has suggested a comparison of his theory with the views of others, as Buffon, *His. Nat. Gen.*, ed. 1740, tome ii., pp. 54, 62, 329, 333, 420, 425, where the conception of "organic molecules" is distinctly broached in connection with his theory of generation and elsewhere; also Charles Bonnet, *Œuvres d'Hist. Nat.*, tome v., pt. i., 1781, 4to ed., p. 334; and Richard Owen, *Parthenogenesis*, 1849, p. 5–8. Darwin's and kindred theories are opposed by the results of Gratton's experiments on the transfusion of blood from certain varieties of rabbits into the veins of the silver-gray rabbit, since no effects were produced.

See criticisms of Mr. Darwin's hypothesis by G. H. Lewes, *Fortnightly Review*, New Ser., iii., 352, April, 1868; Delpino, *Revista Contemporanea Nazionale Italiana*, translation in *Scientific Opinion* for Sept. 29, Oct. 6, and Oct. 13, 1869, pp. 365, 391, 407. See also Darwin's reply to latter in *Scientific Opinion*, Oct. 20, 1869.

(3) *The Plastidule Hypothesis of Elsberg.*—(*Regeneration or the preservation of organic molecules*, Proc. Amer. Assoc., 1874, B., p. 87; *On the Plastidule Hypothesis*, *ib.*, 1876, p. 178. See also *London Microscopical Journal*, 1872, p. 182. Elsberg's hypothesis has been criticised by Mr. E. Ray Lankester in *Nature*, July 13, 1876, but Elsberg's conception has not been understood by Lankester.) This hypothesis promul-

gated with much ingenuity is similar to the preceding. The ultimate organic units or "plastidules" are the smallest organizable portions of the "plastid" or "form-elements"—that is, cells in the most general sense, whether with walls and nuclei or without them. These are not, like gemmules, supposed to be thrown off from existing cells, but are primary formations from ultimate atoms, existing before cell-organization, and tributary to it. They come into existence continually from primitive plasson (protoplasm); and the various grades of organic life are indices of the remoteness of the initial point of the genealogical line. Every germ contains plastidules inherited from the line of ancestral organisms back to a remote period. Mr. Elsberg distinctly describes the plastidule as "a centre or bundle of force" quite as much as a material centre; and indeed seems indifferent whether the plastidule is viewed from the dynamical or the material standpoint, since, "whenever we deal in science, exclusively with either matter or force, we have to do with but one of two aspects of one and the same thing." This Haeckelian phrase leads us to the next.

(4) *The Perigenesis Hypothesis of Haeckel.*—With Prof. Ernst Haeckel the plastidule is itself possessed of a psychic nature; and not only the plastidule, but every inorganic molecule, and not only molecules but every atom of the material world, which, with him, is the only world that exists. "Every atom," he says, "possesses an inherent sum of force, and in this sense is endowed with a soul (beseelt). Without the recognition of an atom soul, all the commonest and most general phenomena of chemistry are inexplicable. Like and dislike, desire and aversion, attraction and repulsion, must be common to all atoms; since the movements of the atoms which must take place in the formation and dissolution of every chemical union can only be explained by ascribing to them *perception* and *volition*. . . . But the organic molecule is more highly endowed than the inorganic. It possesses the power of reproduction or memory. . . . All plastidules possess memory; this capacity is wanting in all other molecules. . . . Without the recognition of an unconscious memory in living matter, the most important vital functions remain totally inexplicable" (*Die Perigenesis der Plastidule, oder die Wellenzeugung der Lebenstheilchen.* Berlin, 1876, pp. 36–41). These views are also distinctly uttered in his famous Munich address (*Die heutige Entwickelungslehre in Verhältnisse zur Gesammtwissenschaft.* Stuttgart, 1877, pp. 12, 13. Translated in *Nature*, Oct. 4, 1877, and republished in *Pop. Sci. Monthly Supplement.* See also Haeckel, *Studien über Moneren und andere Protisten*). Without quoting further we reproduce a concluding passage: "Accordingly we must suppose that the cell-soul, the foundation of empirical psychology, is a compound itself, namely, the total result of the psychic activities of the protoplasm molecules which we briefly style plastidules. The plastidule soul would therefore be the last factor of organic soul-life." Thus, in the Haeckelian conception of the world we recede toward Leibnitz, Bruno, and Empedocles.

The more immediate application of this conception will now be shown. Haeckel supposes the ultimate atoms of matter to unite to form (inorganic) molecules and (organic) plastidules. The plastidules constitute the ultimate life-substance, the primitive form of which is *archiplasson*. The first developmental stage is *monoplasson*, seen in cytodes or non-nucleated cells. The third is *protoplasm*, seen in the cell-substance after differentiation of the nucleus; and the fourth is *coccoplasma*, or the nuclear substance itself. The cells and the cytodes are collectively plastids. Only the plastidules possess memory, which is a reproductive power. Reproduction confers the distinctive property of growth, which is fed by the continual assimilation (intussusception) of new material from the inorganic realm; and the latter depends on the consistency of the organic substance as its condition, and on the molecular structure of carbon compounds as its cause. Growth through intussusception conditions those most important factors of life-phenomena, reproduction and inheritance. Reproduction in the simplest sense is merely the overgrowth of the individual in an eliminated or isolated aggregate of plastidules. Inheritance is a necessary consequence of the continuity of the original in its eliminated part.

The plastidules, however, are subject to influences external to themselves. They tend to adapt themselves to the varying conditions, and thus develop variations which are transmitted to their posterity. Thus natural selection exists among the plastidules (molecules) as Pfaunder in 1870 suggested, and Huxley before him in 1869. (See *The Genealogy of Animals*, The Academy, 1869.) Thus, also, the variation of organic tissues and finally of organic forms and their adaptation to the changing environment are but the integrations of the infinitesimal plastidule phenomena. As the plastids in progressively higher structures acquire not only changed forms and movements but specialized work, and this division of labor develops into the widest specialization of organs seen in highest animals, it is division of labor among the ultimate plastidules which stands at the originative point of all this class of phenomena.

One of the distinctions resulting from this progressive differentiation is the sexual. Between simple (monogonic or asexual) reproduction and sexual (amphigonic) reproduction, no abrupt distinction exists, as is shown by the phenomena of conjugation and copulation among numerous lower organisms, and of parthenogenesis among various groups of higher animals and plants. In sexual reproduction, two cells with their respective plastidule movements are blended together, and the offspring represents the diagonal in the theorem of the parallelogram of forces. Thus sexual reproduction is nothing but a special form of growth of the individual, and the phenomena of genesis, inheritance, and atavism cease to be mysteries. Finally, the biogenetic process presents itself to us as a periodic movement; its nearest analogue is wave-motion. In the genealogical descent of each individual (plastidule or other organic form) we see the representation of wave progress. This is perigenesis, or the periodic wave-production of the life-particles.

Here the principle of inheritance is the *memory* of the plastidule, and theprinciple of variability is the *understanding* of the plastidule co-ordinating its movements to the environment.

In a later hypothesis emitted by Charles Morris (*Amer. Nat.*, xvi., 559 *seq.*, July, 1882) leucocytes or white corpuscles of the blood are the true germinal particles. With power of feeding on the nutrient particles in the blood (described by Beale and Max Schultze), of growth and reproduction, like real protozoa, they become each a generalized representative of all parts of the body. W. K. Brooks in *The Law of Heredity. A study of the cause of Variation and the Origin of Living Organisms* (, pp. 336) maintains with Darwin the emission of gem- bu on occasion of a change in environment. the peculiar power of gathering and sto originating factor, while the factor. The

ovum tends to exact heredity, the spermatozoön to variation and adaptation.

3. *Selection and the Accumulation of Variations.*—According to the profound suggestion of Mr. Darwin, the struggle for existence which we have contemplated as arising under circumstances of discord with the environment (taken in its widest sense) and which furnishes the occasions for those variations in the action of the nutritive organs which induce variations in organic structure, is also a struggle which, in connection with the law of inheritance, leads to the secular *accumulation* of organic variations, and their usurpation of the place of the older structures. Those individuals in which structural variation responds most promptly and most perfectly to changes in the environment acquire advantages over others, and in the struggles for existence and comfort prevail over them. The variant type tends, therefore, to perpetuate itself, and the old type tends to extermination. Nature thus selects the individuals best fitted to fulfil the functions of life, and secures to them the office of perpetuating the genetic line. The forms which the struggle for existence takes are those which we have already contemplated in connection with the inception of variations. They are conflicts of individuals with each other, and conflicts with physical surroundings. Among these the conflicts of males for the possession of females have led by selection to wide sexual divergences in most of the higher species, as it is supposed the females have manifested preferences for males possessing certain characters, and have thus secured them advantages. Mr. Darwin lays great stress on sexual selection, and has illustrated it copiously (*Origin of Species*, Am. ed., 83; *The Descent of Man*, parts II. and III.).

(1) *Usefulness to the Individual.*—But the selection and preservation of a structural variation implies that the variation confers some advantages. If conferring no advantages in the struggles of life, natural selection would lead to its disappearance. All variations begun, perpetuated, or accumulated through discord with the environment and natural selection must necessarily be variations securing advantages to the individual. Mr. Darwin, as is well known, insists on the point, and, in his first work, maintains that no other new structures could have arisen than those elicited into development by natural selection for the good of the individual; and he says, "if it could be proved that any structure of any one species had been formed for the exclusive good of another species it would annihilate my theory, for such could not have been produced through natural selection." It has been pointed out, however, by Nägeli, Broca, and many others, that variations do originate which are "neither beneficial nor injurious;" and Mr. Darwin has been over-facile in magnifying the importance of his first error in formulating an induction in terms too absolute. Undoubtedly variations arise, like the disappearance of the forefinger in the Potts monkey (*Perodicticus*), and are perpetuated, which sustain no discoverable relation of usefulness to the individual. But such facts, instead of breaking down the principle of natural selection, show simply that it does not explain *all* variations and *all* structures.

(2) *Minuteness of Variations.*—Mr. Darwin also emphasizes frequently the statement that variations progress by minutely graduated steps. "As natural selection acts solely by accumulating slight, successive, favorable variations, it can produce no great or sudden modification." "If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down" (*Origin of Species*, Am. ed., 408, 169). Now, as natural selection has nothing to do with the origination of a variation, but only with its preservation, it is manifest at once that the principle is effective when it preserves a large variation as well as in the case of a small one. If then there be causes which produce sudden and considerable variations, we may qualify Mr. Darwin's too hasty admission without impairing the principle of natural selection as a real law of nature. Now, it is perfectly notorious that abrupt variations frequently arise, and Mr. Darwin has himself cited many of them. As Mr. Huxley also says, "we greatly suspect that she [nature] does make considerable jumps in the way of variation now and then, and that these saltations give rise to some of the gaps which appear to exist in the series of known forms." But it seems disingenuous to urge such needed qualifications of Mr. Darwin's views as something having a destructive tendency.

(3) *How is the Ascendency of a Variety Acquired?*—The importance of isolation was recognized by Darwin (*Origin of Species*, Am. ed., p. 97), and it is at once apparent, as was powerfully argued by an oft-quoted writer, in the *North British Review*, that a single individual, coming into existence with some new modification of structure—even if a highly advantageous one—would be unable to confer his peculiarity in any important degree of development upon the whole membership of a species. As well expect a white man cast upon a continent of blacks to transform the black race into a white one simply by virtue of some superior advantages possessed by him in the struggle for existence. Evidently some principle, different from the simple increase of population, must be active, if the peculiarity ever becomes the common property of a numerous progeny.

This necessity has often been urged as a failure of the principle of natural selection to explain the cumulation of variations of a particular kind, and their ultimate wide dispersion among many individuals. Mr. Darwin seems to have trusted to a persistent tendency of the peculiarity to reproduce itself and displace old characteristics, and to the probability that an environment which could condition a useful peculiarity in one individual would condition it in many, and predispose to the conservation and restoration of it in many more which may have received but a diminished representation of it through inheritance. Numerous biological facts demonstrate the operation of some such tendencies. We do know that the same peculiarity recurs again and again, in a succession of generations, in a full state of development, in spite of crossings with individuals destitute of such peculiarities. Still, the case seemed to require the intervention of some special principle, and Moritz Wagner, a devoted Darwinian, suggested what he styled the "law of migration." "The migration of organisms," he says, "and the formation of colonies by them, is the necessary condition of natural selection" (*Die Darwin'sche Theorie und das Migrationsgesetz der Organismen*, 1868). The isolation of those individuals in which a peculiarity of structure appears and the prevention of crossings with their stationary congeners is, he thinks, indispensable. It is easy to understand the tendency of isolation, though on the simple principle of inheritance the peculiarity of one individual would, in any

event, become reduced in transmission to any number of individuals, however small. Many considerations show, moreover, that such isolation is not essential. In the first place, isolation is unnecessary throughout the whole range of lower forms in which asexual propagation takes place. Again, the phenomena of dimorphism among plants and butterflies exemplify the persistence of morphological variations in the midst of differing conspecific forms, even where the peculiarity confers no conceivable advantage. Further, the remarkable case of the lake of Steinheim exhibits the slow formation of new and divergent species, in the progress of many generations, even while the unaltered or variously altered forms densely populated the same situation (Hilgendorf: *Ueber Planorbis multiformis in Steinheimer Süsswasserkalk*, Monatsb. K. P. Akad., Berlin, July, 1855, 474, with plate; A. Hyatt: *Transformations of Planorbis*, etc., Proc. Amer. Assoc. Adv. Sci., 1880, 527–50, plate; and *Genesis of Planorbis at Steinheim*, Ann. Mem. Boston Soc. Nat. Hist., 1880. It cannot be doubted that a patient study of the recorded facts of palæontology would prove the existence of many similar cases. Nägeli has even insisted that "gregariousness of merely allied species and their varieties proves more favorable to the formation of a species than isolation." "The associate forms of certain Alpine plants have, as it were, reciprocally modified one another; they exhibit, to express myself thus, a specific social type, which is different in each assemblage, and therefore in every neighborhood. This fact incontrovertibly shows that the forms have altered since they were associated" (*Sitzungsber. der Math.-physikal. Klasse der Münchener Akad.*, 1872, p. 305). It would seem, therefore, that some conservative and reproductive force exists which modifies the absolute sway of the law of inheritance. Mr. Darwin, with phenomenal self-forgetfulness, not only allows the exceptions of Nägeli, Broca, and others, but impugns his principle of natural selection with far greater severity than the case demands. His acknowledgments have even been made a ground for asserting his abandonment of all which is characteristic in Darwinism. But this is a conclusion which will not stand. It is not necessary to explain *all* variations by the principle of natural selection, nor to explain any variation *completely* by this principle.

(4) *Coördinative Selection.*—As the inception of variations frequently reveals itself simultaneously in homologous parts, so the conservation and cumulation of variations is modified by homologies of parts. But more especially is a coördination of accumulated variations noticeable in the growth of internal parts. Here a process of selection manifests itself: 1*st*, in the selection of appropriate material out of the mass of crude nutriment supplied by ingestion; 2*d*, in the collocation of the organic molecules after such fashion as to result in fabrics of definite kinds—cells, fibres, membranes, vessels, and various tissues; 3*d*, the collocation of these parts for economy of space and for functional inter-action and co-action; 4*th*, the determination of these selections and actions in changed channels in correlation with changes in the environment. Thus coördination of selection is a phase of selection which must not be overlooked in a merely descriptive statement.

(5) *Natural Selection not a Causal Agency.*—Natural selection is a means of conserving something which exists. The origin of the thing conserved is quite apart. This discrimination seems so obvious that one feels surprise at the language employed by some writers. Haeckel speaks of natural selection as a "*causale Fundament*," and as "*die wirkenden Ursachen der Veränderungen*;" and natural selection is commonly referred to as a "true cause" of variations, and of the origin of species. Mr. Darwin himself sometimes loosely implies conceptions of this kind, but in other passages a due discrimination is maintained. Attempts have been made to discredit Darwinism on the ground that it assumes to explain the origin of species by a principle which is only modal, not causal. But Mr. Darwin nowhere assumes that "natural selection *is* the origin of species." He shows that natural selection is a "*means*" by which new specific forms arise, and we are left to seek the *cause* which employs the *means*.

C. Natural Selection in a General Sense.—Mr. Darwin conceived of natural selection almost exclusively in its relation to organic beings. He does, indeed, illustrate its action by reference to the evolution of languages and dialects, and in a retrospective view of the discussion says: "In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history." There is no reason, therefore, for assuming that he was ignorant of the breadth of application of the principle which he so richly elucidated. Manifestly, the most generalized conception of the survival of the fittest as progress through antagonism expresses a universal truth. It was an induction reached by the earliest thinkers of the human species. Herakleitos (about 500 B. C.), by his doctrine of the perpetual flux of things and the unceasing conflict between opposites, in the midst of which individual things maintain themselves against the universal processes of destruction and renovation, seems to have glimpsed dimly the abstract conception which Darwin's doctrine has clothed in concrete form. The fundamental thought of the whole atomic philosophy was the survival of forms which proved worthy to survive, and the extinction of others. In our own times, however, the application of the principle has been admirably worked out by various writers in various fields. The triumph of Darwinism itself is a striking illustration of the survival of the fittest in the realm of theoretical science. Language, anthropology, psychology, art, society, forms and systems of religion, cosmogony, are so many fields in which the operation of the struggle for existence and natural selection has been traced out by a band of brilliant thinkers. [See Encyclopædia Britannica, Article Evolution, Part II., Evolution in Philosophy.]

II. Darwinism as the Equivalent of the Doctrine of Descent.—Natural selection implies a progressive and unlimited tendency to structural change. The susceptibility to variation, and the certainty of the conservation and augmentation of beneficial variations, guarantee a perpetual flux of characters. That which we have defined as a specific form is only the momentary value of a variable quantity. It was something different at a former period; it will be something else in the future. The old conception of the species is erroneous. Races and varieties are early stadia in progressive divergence from a given point, and species are only more advanced in the same progress. Of genera and all the higher groups the reason is in the same way. The natural selection, therefore, involves of all

organic forms. Mr. Darwin, as he tells us, held for years to the derivative theory before he fixed on the principle of natural selection as an explanation of the mode of derivation. Undoubtedly many other scientists were half persuaded of the soundness of derivative theory, but it cannot be denied that Mr. Darwin's presentation of so probable a mode of derivation made rapid converts to the doctrine of descent. His vast accumulations of facts not only illustrated his special principle, but furnished the strongest evidence ever presented of the truth of the doctrine of descent. Darwinism may therefore be defined, in a just sense, as a phase of the doctrine of descent which holds that natural selection is the main condition of the survival and accumulation of variations. Mr. Darwin was at first strongly persuaded "that natural selection has been the main but not exclusive means of modification;" but in a later work he admits that he "probably attributed too much to the action of natural selection or the survival of the fittest." Again, he speaks of the influence of "the constitution of the varying organism," and the "action of those unknown agencies which occasionally induce strongly marked and abrupt deviations of structure." Again, speaking of structures now useless, he says: "Such structures cannot be accounted for by any form of selection, or by the inherited effects of the use and disuse of parts." Many passages of similar purport might be quoted from his later works. But the proper inference to be drawn is *not* that the author abandoned his theory, nor that natural selection is *not* a potent factor in the derivative origination of species, but simply that criticism has shown it to be less sufficient than was at first concluded. While, therefore, the peculiar conception of Darwinism has contributed so powerfully to the establishment of derivative doctrine, it must not be supposed that derivative doctrine stands or falls with it. The derivation of species may be a fact, even if the Darwinian explanation does not contain a word of truth. This is important to be borne in mind, since many writers imagine that when they have impugned Mr. Darwin's positions on natural selection, or sexual selection, or pangenesis, they have dealt a destructive blow against derivative theory in general.

Mr. Darwin's theory is only one of many speculations offered with a view to explaining the preassumed fact of a derivative origin of species. The fact of such origin being established or presumptively established the speculative mind looks about in search of the causes, conditions, and instrumentalities of variation. Are variations always insensible, or sometimes saltative? Are they impressed upon the organism by influences exerted from without, or do they arise from actions seated within? To what extent is the seat of assumed internal actions located in the reproductive elements, and to what extent in the embryo? What part is played by parthenogenesis and by extraordinary births? Are influences exerted upon the embryo through the prolongation or shortening of its period, or through accceleration and retardation of its rate of development, or exclusively through the reaction of the mother on the embryo? Is there any inherent nisus or tendency in the organism to vary in any particular direction, or to vary at random? and if the latter, what determines variation according to definite methods? Finally, is there any manifestation of force in the growing, changing aspects of the organism and in its coördinative phenomena, which cannot be referred to matter and its inherent potencies? These are the questions which various theorists have endeavored to answer; and the various theories, Darwin's included, lie within this domain. Every theory may prove false, and yet the derivative origin of species remain a fact. The general evidence in support of the theory of derivation is presented in the article EVOLUTION, already referred to. Here we simply correlate the principal phases of theory in a compact tabular exhibit:

I. IMMEDIATE CREATION (Material Discontinuity).
1. In single Pairs.....This popular opinion was held by *Linnæus*, *Cuvier*, etc.
2. In Colonies.....*L. Agassiz*, etc.

II. MEDIATE CREATION OR DERIVATION (Material Continuity or Evolution).
1. Through a Force which is a mode of the unknowable.....*Herbert Spencer.*
2. Through so-called external influences or forces, acting on the organism.
(1) Physical surroundings (Transmutation).....*De Maillet.*
(2) The same, and conflicts of individuals (Natural Selection), with use and disuse.
(a) With isolation of changed individuals.....*Moritz Wagner.*
(b) Without isolation of changed individuals.
(a′) Embracing the psychic nature of man.
(a″) By insensible gradations (Variative).....*Darwin*, *Haeckel.*
(b″) With occasional leaps (Saltative) and with a molecular selection..*Huxley*, etc.
(b′) Perhaps excluding the body and mind of man.....*Wallace.*
3. Through an internal force, conditioned by the environment, and by use and disuse.
(1) An inherent nisus toward improvement (Conative-variative).....*Lamarck*, *St. Hilaire.*
(2) Genetic processes exclusively (Filiative).
(a) Prolonged embryonic development (Variative-filiative)...*R. Chambers* in "*Vestiges.*"
(b) Extraordinary births (Saltative-thaumogene).
(a′) Heterogeneous generation.....*Kölliker*, *Ferris.*
(b′) Homogeneous generation.....*Parsons*, *Owen.*
(3) An immaterial Force, genetic processes being the instrument, saltations admitted.
(a) Excluding the psychic nature of man.....*Mivart.*
(b) Including the psychic nature of man.
(a′) Through ordinary generation.....*Huxley.*
(b′) Accelerated development.....*Hyatt.*
(c′) Accelerated and retarded development.....*Cope.*

III. Darwinism as the Equivalent of Evolution.—This conception of Darwinism is merely a popular misapprehension. If Darwinism in the sense last considered is a straining of terms, Darwinism in the present sense must be disallowed. (See Evolution, in the Encyclopædia Britannica.)

IV. Darwinism in Relation to Philosophy.—The relations of Evolution and of Lamarckism to the history of philosophic thought and to the content of philosophy are considered under Evolution (*ubi supra*). Here we simply state briefly some views on the relation of these theories to the principle of causality. It is worthy of remark, first of all, that the question of evolution, either in organic or inorganic nature, is simply a question of fact, and the answer is to be sought by observation. Do phenomena actually emerge into existence in material continuity with antecedents? We may discover ground for answering this question in the affirmative without considering either the finitude or infinitude of the series, or the nature of the efficiency concerned, or the question whether the efficiency has been propagated from the beginning—even if an infinite beginning—or inheres in the matter which is transformed, or is an immanent efficiency external to matter. Nor does this question of fact concern the nature of matter, nor the unity or duality of substance. Endless diversities of opinion may be entertained on these ulterior questions by those who maintain unanimously the reality of a method of evolution in nature. This discrimination is most fundamental, and exposes the error of those who think the recognition of a universal method of evolution is the adoption of a theory of self-evolution, or the rejection of the doctrine of absolute originations, or the endowment of matter with all-sufficient potencies. For our present purpose it is not necessary to adopt any one of the divergent views entertained by the body of evolutionists on the speculative questions indicated, since the *relation* of evolution to causality is shown when we indicate clearly the fact that evolution concerns only the nature of the succession of passing events, not their origin or their causal connection with each other or with an external cause momentarily acting.

If the essential system of evolution as a whole is thus unencumbered by questions of ontology and ætiology, still less do such questions necessarily connect themselves with the recognition of the subordinate principle of natural selection. This is not the name of a force in evolution, but only of the result or outcome of the action of those forces which secure the survival of the fittest. It is the name of an effect, and not of a cause. The gradually transformed condition of the genetic line is not the effect of natural selection, but only an aspect of natural selection viewed in its relation to time. It is therefore a philosophic misapprehension to speak of natural selection as something substantive, which acts as a causal or even a conditioning factor. We may speak of variations (not as originating, but) as accumulating, and aggregating to the extent of specific transformations, under the law of natural selection; but we cannot discriminatingly speak of the law as effecting such transformations. He who holds to the reality of a process of natural selection in nature is not bound to any theory of causation whatever.

But further, the environment of an organism cannot in any philosophic sense be regarded as causative in relation to the structures which [illegible] nation with it. These structures are gr [illegible]hs are results produced by the action of forces in the organism. The environment furnishes occasions for particular modes of action of the forces of growth. So far as conditions may by any be embraced in the conception of cause, the environment may enter into the cause but the ultimate productive causality reveals itself in the organism. It is a philosophic error, therefore, to conceive the conditions of existence as *producing* any given modification of organic structure.

In regard to the nature and the subjective ground of the forces of growth a diversity of opinion may be entertained. Some hold that these forces are only the forces inherent in matter as such; some maintain still the existence of a special vital force; and some, denying the inherency of forces in matter, maintain the existence of some force metaphysically external to the organism, and acting within the organism; some posit the discernment revealed in the mode of action of these forces in the unconscious organic molecules, or in these and the ultimate atoms, or in a separate will or unconscious intelligence as a *tertium quid*, while others discern a distinct conscious spiritual entity present, exerting the forces of growth and guiding their action by its own discernment.

Even the question of teleology is not touched by these doctrines, since the pure mechanical theorist may still maintain that every event takes place without purpose; and the teleologist may maintain that intention is likely to seek its end through the use of means, and that the more orderly and uniform we find the succession of events, the greater the evidence of the regulative principle of purposeful intelligence; and that in any event it is impossible to show that the whole system of evolution does not exist for a purpose.

Hence, on all the ulterior questions concerning the unity or the nature of substance, and the proper views of causality in nature, evolutionists may entertain beliefs as divergent as existed before the epoch of Darwin. The ranks of the evolutionists, and even of the Darwinians, as a fact, embrace believers in monism and dualism; in materialism and idealism; in the eternity of the world and in the finite origination of the world; in the eternity of matter and the finite origination of matter; in the derivation of man and the separate origin of man; in atheism, or in primordial creation, or in immanent creative causation.

In addition to the works already cited we mention the following by Mr. Darwin: *On the Fertilization of Orchids by Insects* (365 pp., 1862); *On the Movements and Habits of Climbing Plants*, Jour. Linn. Soc., 1867 (*Bot.*), 1–118, as a separate work in 1875; *The Descent of Man and Selection in Relation to Sex* (2 vols., 1875); *The Expression of the Emotions in Man and Animals* (304 pp., 1872); *Insectivorous Plants* (462 pp., 1875); *The Effects of Cross-and Self-Fertilization in the Vegetable Kingdom* (182 pp., 1876); *The Formation of Vegetable Mould through the Action of Worms* (1881); and the scientific journals contain over twenty important articles dating from 1858.

The following works may also be consulted: A. R. Wallace: *Contributions to the Theory of Natural Selection* (Am. ed., 1871); Asa Gray: *Darwiniana* (1878); T. H. Huxley: *On the Origin of Species, or the Causes of the Phenomena of Organic Nature*; G. J. Romanes: *The Scientific Evidences of Organic Evolution* (London, 1882); St. George Mivart: *Man and Apes* (Am. ed., 1874); Karl Semper: *Animal Life as Affected by the Natural Conditions of Existence*, Internat. Scient. Series; E. R. Lankester: *Degeneration, a Chapter in Darwinism* (London, 1880); Lindsay: *Mind in the Lower Animals* (London, 1879); G. J. Romanes: *Animal Intelligence* (London, 1882, New York, 1883); E. Haeckel: *Anthropo-*

genie, Entwickelungsgeschichte des Menschen (Leipzig, 1874, also an English translation); *Ziele und Wege der Heutigen Entwickelungsgeschichte* (99 pp., Jena, 1875); Arnold Dodel: *Die neuere Schöpfungsgeschichte* (518 pp., Leipzig, 1875); C. Semper: *Die Verwandtschaftsbeziehungen der gegliederten Thiere* (16 plates, 8 vo., 367 pp., Wurtzburg, 1875); A. Kölliker: *Entwickelungsgeschichte des Menschen und der höheren Thiere 1ste Hälfte* (399 pp., Leipzig, 1876); Georg Seidlitz: *Beiträge zur Descendenz-Theorie* (176 pp., Leipzig, 1876); Hermann Müller: *The Fertilization of Flowers* (Transl., London, 1883, 669 pp.); Fritz Müller: *Für Darwin* (91 pp., Leipzig, 1864); A Müller: *Ueber die erste Entstehung organischen Wesen u. deren Spaltung in Arten* (Berlin, 1866); Otto Zacharias: *Zur Entwickelungstheorie* (127 pp., Jena, 1876); Francis Galton: *Inquiries into Human Faculty and its Development* (1883, 8vo., 380 pp.); W. Roux: *Der Kampf der Theile im Organismus* (244 pp., Leipzig, 1881); Gustav Jäger: *In Sachen Darwin's insbesondere contra Wigand* (264 pp., Stuttgart, 1874); P. Jacoby: *Etudes sur la Sélection dans ses rapports avec l'héredité chez l'homme.* On the philosophic aspects of Darwinism: G. H. Schneider: *Der thierischen Wille* (xx. and 447 pp., Leipzig, 1880); Eugen Dreher: *Der Darwinismus und seine Stellung in der Philosophie* (160 pp., Berlin, 1877); George Henslow: *The Theory of Evolution of Living Things, and the Application of the Principle of Evolution to Religion* (220 pp., New York, 1873); Joseph Leconte: *Religion and Science* (324 pp., New York, 1874); Georg Von Gizycki: *Philosophische Consequenzen der Lamarck-Darwin'schen Entwickelungstheorie* (97 pp., Leipzig and Heidelberg, 1876); Fritz Schultze: *Kant und Darwin, ein Beitrag zur Geschichte der Entwickelungslehre* (279 pp., Jena, 1875); Rudolf Schmid: *Die Darwin'schen Theorien und ihre Stellung zur Philosophie, Religion und Morals* (403 pp., Stuttgart, 1876); Edith Simcox: *Natural Law, an Essay in Ethics* (361 pp., Boston, 1877); Chauncey Wright: *Philosophical Discussions* (434 pp., especially pp. 97–266); J. L. Diman: *The Theistic Argument, as Affected by Recent Theories* (Boston, 1882). Works of a critical and adverse character: A. Wigand: *Der Darwinismus und die Naturforschung Newtons und Cuviers* (3 vols., 1874–7, pp. 462, 516, 320); E. Von Hartmann: *Wahrheit und Irrthum in Darwinismus* (177 pp., Berlin, 1875); R. Virchow: *Die Freiheit der Wissenschaft im modernen Staat* (32 pp., Berlin, 1877); C. Semper: *Haeckelismus in der Zoölogie* (36 pp., Hamburg, 1876); F. Michaelis: *Anti-Darwinistische Beobachtungen* (85 pp., Bonn, 1877); St. George Mivart: *On the Genesis of Species* (Am. ed., 1871, 314 pp.); *Lessons from Nature as Manifested in Mind and Matter* (Am. ed., 462 pp., New York, 1876); *Contemporary Evolution* (254 pp., Am. ed., New York, 1876); G. Canestrini: *La Teoria di Darwin criticamente exposta, Biblioteca Scientifica Internationale* (350 pp., Milano, 1880); C. Elam: *Winds of Doctrine, being an examination of the modern Theories of Atomism and Evolution* (163 pp., London, 1877); L. Agassiz: *Contributions to the Natural History of the United States*, vol. i. "Essay on Classification;" also *Amer. Jour. Sci.*, July, 1860; J. W. Dawson: *The Story of the Earth and Man* (403 pp., 1873); Charles Hodge: *What is Darwinism?* (New York, 1874); J. Barrande: *Trilobites* (282 pp., 1871), a Supplement to *Système Silurien dur Centre de la Bohême*, and compare also *Distribution des Céphalopodes* (480 pp., 1870), *Céphalopodes* (253 pp., 1877), and *Brachiopodes* (355 pp., 1879). A journal of highest ability devoted to evolution is *Kosmos, Zeitschrift für einheitliche Weltanschauung auf Grund der Entwickelungslehre, in Verbindung mit Charles Darwin und Ernst Haeckel, sowie einer Reihe hervorragenden Forscher auf den Gebieten des Darwinismus* (monthly, 80 pp., since 1876).

(A. W.)

DASENT, Sir George Webbe, D.C.L., an English author, was born in 1820 in the island of St. Vincent, West Indies, where his father was treasurer-general. He was educated at King's College, London, and at Oxford, taking his degree in 1840. He was called to the bar at the Middle Temple in 1852, and has held various official positions. He was also active in literary work, and for many years was a steady contributor to the London *Times*, of which he became assistant editor. He was also for several years the editor of *Fraser's Magazine*. He has been a diligent student of Norse literature and is best known by his translations from that language. The earliest of these was *The Prose or Younger Edda* (1842), which was followed by *Theophilus Eutychianus* (1845), a polyglot account of the legend of Bishop Theophilus. He also published *The Norsemen in Iceland* (1855), and *Popular Tales from the Norse*, with an introductory essay (1859). The last were translations from the *Tales* of P. C. Asbjörnsen, and from the same source he has taken *Tales from the Fjeld* (1873). His *Story of Burnt Njal* (1861) is a translation of the finest family saga of Iceland, with an introduction on Icelandic laws and customs. Dasent has also published some novels: *Annals of an Eventful Life* (1871); *Three to One, or Lady Sweetapple* (1872); *Half a Life* (1874); and the *Vikings of the Baltic* (1875), a tale of the tenth century, founded on the *Jornsvikinga Saga*. He has collected a number of his essays into two volumes under the title *Jest and Earnest* (1875). In 1876 he received the honor of knighthood.

DAUDET, Alphonse, a French dramatist and novelist, was born at Nîmes, May 13, 1840. His father was a merchant of that city, who, after some years of prosperity, failed in 1848. But, though reduced to poverty, he gave his sons good facilities for education. Alphonse went to Paris in 1857 with his brother Ernest, and in the next year published a volume of poems, *Les Amoureuses*, which was followed by a second in 1861. Then he began to write for the stage, to which he contributed several comedies, dramas, and operas, some of which still retain their place. His first play was *La Dernière Idole*, produced at the Odéon in 1862. Others were *Le Frère aîné*, a drama in one act; *Le Sacrifice*, a comedy in three acts; *Le Char*, a comic opera. Meantime he composed several novels, and gradually adopted the plan, which finally gave him wide popularity, of mingling with his fiction the facts of the day. The first short stories of this kind were *Lettres de mon Moulin* (1869) and *Lettres à un Absent* (1871). Growing more expert with practice, he published *Le petit Chose* (1868), a story founded on his own childhood; then *Fromont jeune et Risler aîné* (1874), which was crowned by the French Academy and dramatized by the author. This work established his reputation, but it has been surpassed in popularity by his later novels. *Jack*, a story of a workingman, appeared in 1876, and, finally, in 1878, *Le Nabab*, which at once achieved a remarkable success. This was due in great measure to its vivid presentation of the most prominent persons connected with the second French Empire. His most notable and successful recent work is *Tartarin of Tarascon*, a humorous production, which forms in a measure a modern *Don Quixote*. It has been followed by *Tartarin on the Alps*, and *Port Tarascon* (1890), as sequels. His recent serious novels include *L'Evangeliste* (1883), dealing with the Salvation Army, *Sapho* (1884), and *L'Immortel* (1888), which ridicules the French Academy. He has also published autobiographical and other works. Daudet is admitted by critics who have censured his works most strongly to be one of the most powerful writers of the present day.

—His wife, Madame Daudet (née Allard), has contributed literary articles and criticisms to several journals, and has published a selection of these under the title *Impressions de Nature et d'Art*, (1879).

DAUDET, Ernest, a French journalist, novelist, and historian, brother of the preceding, was born at Nîmes, May 31, 1837. Removing to Paris in 1857, he became secretary to M. de Morny, president of the Legislative Assembly, afterwards editorial secretary of the proceedings of the Assembly, and finally chief clerk of the Senate. While holding these positions he was a constant contributor to various journals in Paris, in the departments, and in foreign countries. In May, 1873, he was appointed director of the *Journal officiel*. After holding this position three years, in 1877, in company with M. de Villemessant, he founded the journal *L'Estafette*, of which he has since been chief editor. He was admitted to the Legion of Honor in 1868. His novels are numerous: the first, *Thérèse*, was published in 1859; among the rest are *La Succession Charanet* (1867), *Le Missionnaire* (1867), *Fleur de Péché* (1872), *Les Aventures de Raymond Rocheray* (1875), *Zarah Marsy* (1878), *Le Mari* (1880), *Pervertis* (1881), *La Carmelite* (1882). His other works have generally been discussions of the political questions of the day, though in later years they have risen to the dignity of history. Among them are—*Les Journaux religieux et les Journalistes catholiques* (1860), *La Vérité sur l'Essai de Restauration monarchique* (1873), *La Terreur blanche* (1876), *L'Histoire des Conspirations royalistiques du Midi sous la Révolution* (1881). The last has been crowned by the French Academy and a prize granted to the author. Since 1877, M. Daudet has been authorized to make researches among the state papers in preparation for his *Histoire de la Réaction thermidorienne*. He has also written an attractive autobiographical sketch under the title *Mon Frère et Moi* (1881), and in conjunction with G. A. Thierry has prepared a play called *Fouché*.

DAUMER, Georg Friedrich (1800–1875), a German poet and philosopher, born at Nuremberg, March 5, 1800; studied at the gymnasium of that town, then under the rectorship of Hegel, and at Erlangen took the courses in divinity and philosophy, where Schelling was his master. After a year in Leipzic he became in 1822 a preparatory teacher, and afterwards was a professor in the gymnasium of his native city. Among his early works are *Urgeschichte des Menschengeistes* (1827); *Andeutungen eines Systems der Spekulativen Philosophie* (1831); *Philosophie, Religion und Alterthum* (1833); *Züge zu einer neuen Philosophie der Religion* (1835); *Der Feuer und Molochdienst der Hebräer* (1842), and *Die Geheimnisse des christlichen Alterthums* (1847). The more lately written of these works show a wide departure from the Christian view of history and philosophy; and Daumer soon after became the advocate and herald of a new religion, "the religion of love and peace." His *Religion des neuen Weltalters* (3 vols., 1850) was, however, followed by a reaction which took him in 1858 into the Roman Catholic church. He died at Würzburg, Dec. 14, 1875. Among his numerous later works are *Meine Konversion* (1859); *Aus des Mansarde* (6 parts, 1860–62); *Das Christenthum und sein Urheber* (1864); *Christin Mirabilis und Joseph von Copertino* (1864); *Marianische Legenden und Gedichte* (1859); and a polemic against the teaching of Strauss. He also published several volumes of poems, in part the fruit of his oriental studies. He also published a series (1832, 1859, 1873) of writings designed to show that Kaspar Hauser was a kidnapped son of the Grand Duke of Baden; but official records published in 1875 have shown that this opinion was not correct.

DAVENPORT, a city of Iowa, county-seat of Scott co., on the Mississippi River, opposite Rock Island, Ill. It is 181 miles by rail W. by S. of Chicago, and 240 miles N. by W. of St. Louis. Through it pass the Chicago, Rock Island, and Pacific, the Chicago Milwaukee, and St. Paul, and the Chicago, Burlington, and Quincy Railroads. A noble wrought-iron bridge here crosses the Mississippi, and serves for railway purposes and for carriage travel. The city stands chiefly on a space near the river, partly surrounded by high bluffs, which are themselves built up with handsome residences. Davenport has a very valuable and well-utilized water-power, afforded by the rapids of the Mississippi. It is the seat of the bishop of Iowa (Episcopalian), and of the Roman Catholic bishop of Davenport. Among its important buildings are the city hall, Burtis opera-hall, and the Episcopal cathedral. It has 20 churches, a State home for orphans, 3 Catholic hospitals, 2 Catholic academies, and a convent. It is the seat of Griswold college (Episcopalian), to which are attached preparatory and theological schools. The city has a well managed system of public schools, including a normal school. The manufactures are extensive, and include lumber, farm-implements, glucose, flour, woollens, cordage, tools, castings, and furniture. It has 3 national and 7 other banks, and 3 weekly and 3 daily newspapers. It is lighted with gas and electricity, and has street railways and a water supply. It was settled in 1836. The surrounding country affords bituminous coal and is very fertile. The city itself is one of the handsomest in the United States. Davenport has long been a noted point for the reception and sale of farm-products, and for the distribution of merchandise. It has a property valuation of $7,500,000, and a public debt of $[illegible]0,000. Population, 21,831.

See Vol. VI. p. 736 Am. ed. (p. 836 Edin. ed.).

DAVID. The article in the Encyclopædia Britannica takes the view that the Hebrew text of those parts of the Old Testament which contain the history of David is in very bad condition, so that much of the account is historically uncertain. This opinion does not seems greatly to influence the author's impressions concerning David, but it is nevertheless important. The main speculation is that a part of the story of David and Goliath as it stands in Hebrew copies (1 Sam. xvii. 12–31 and xvii. 55–xviii. 5) has been interpolated into the narrative at a comparatively late date. It is affirmed that this part of the story is not in the Septuagint, and has been inserted in the Hebrew copies since the Greek translation was made, and that it is inconsistent with the rest of the narrative. If this allegation is true, it is seriously disparaging to the Hebrew text as showing that in the centuries just before the Christian era it was very carelessly treated.

See Vol. VI. p. 736 Am. ed. (p. 836 Edin. ed.).

But even if we have conceded that there were two original accounts, from which the Hebrew text was compiled, it does not necessarily follow that one of the accounts is less accurate than the other, nor that the Hebrew text has been changed since it was first written. On this theory it is entirely conceivable that the original sources were yet in existence when the Greek was translated, and that for some reason the translator here substituted one of them for the compiled account of the Hebrew Scriptural text.

We cannot, however, be very sure that the text which omits the parts of the story in the true Septua-

gint text. The omissions occur in the original hand in the Vatican Codex, but not in the other best copies.

Again, if the Septuagint translator, or some previous copyist or translator of this passage, whose work the Septuagint translator here adopted, had desired to abbreviate the story, for the purpose of reducing it to the right length for some use, or that it might just fill up the piece of parchment on which he was writing, he could hardly have abridged more skilfully than he has done. Try the experiment. Suppose a minister wishes to read, in connection with some sermon, the account of Saul's early relations with David, as given in 1st Samuel, xvi. 14 to xviii. 30. Here are about 100 verses. Could he cut out about 40 verses, so as to reduce the account to a manageable length for reading, any better than by omitting just what is omitted in this Greek copy? For it is necessary to notice that this copy not merely omits these two passages, but makes a considerable number of shorter omissions in this part of the narrative. Besides this account of David's coming from the sheepfold to the army, it leaves out of the account the jealousy of Saul concerning the kingdom, and his attempts to kill David (xviii. 8, last clause, to 11), and that of the proposed marriage between Merab and David (xviii. 17–19, and the last half of 21), as well as many of the details of the fight with Goliath, and many examples of Saul's hatred for David (xvii. 41, 50, and parts of 48, 51 ; xviii., parts of 12, 29, 30).

It is evident that we have here the results, not of accident, but of deliberate design. Either some one produced the shorter narrative from the longer, by intentional abridgment, or some one expanded the shorter narrative into the longer. Are there any marks whereby we can decide which process was actually used?

No one would dispute that the external evidence is in favor of the longer text. That is to say, even those who place the lowest estimate upon the Massoretic Hebrew regard it as of higher textual authority than the Septuagint translation. The omitted fragments themselves are consistent with the view that the shorter text is an abridgment. An advocate of the other view says "it is not credible that, if the Septuagint translators had set themselves arbitrarily to cut down a narrative originally homogeneous, the verses which they omit would have palpably hung together as bits of a different and self-consistent account of the whole story." Now if the omitted parts made a complete account, or if they distinctly pointed to some completion of the account different from that here given, there might be some force in this reasoning. But they do neither of these. They show no other homogeneity than would appear in any case where the parts of a story relating to one or two particular phases of it had been omitted, for the purpose of abbreviating the story. This is true, even if we confine our attention to the longer omitted fragments, and emphatically true if we look also at the shorter.

There is no difficulty in the Hebrew account as it stands. The peculiarities upon which most stress has been laid are that Abner and Saul are here represented as not knowing David, although he had already been in court, and become a favorite there; and that no explanation is given of his being absent from court at this particular time. Taking up the second of these difficulties first. An eminent author says: "We learn, without any explanation, that David, although he was Saul's armor-bearer, did not follow him to the field." He also speaks of a "fragment of an independent account of the affair, according to which David had never been at court, but was a mere shepherd boy." These and like statements are mistaken. The account carefully explains why David did not follow Saul to the field; and the omitted verses, instead of representing that David had never been at court, expressly mention that he had been there. Verse 15, beginning as it does with a circumstantial clause, informs us: "Now David had gone and returned from upon Saul, to shepherd the flock of his father." This is mentioned immediately after the statement that his three older brothers were in the army. Could anything be more explicit or more natural? Saul taking the field reduced his peace establishment, sending home his minstrel boy; and instead, he increased his war establishment, by taking three of the minstrel boy's older brothers, while the boy himself did what he could to fill their place at home. What if Saul had already, in time of peace, gratified his dainty-fingered harp-player by giving him a military commission as armor-bearer? He none the less naturally preferred to have veterans about him when it came to actual fighting.

As to the other difficulty, all despots are freaky in their attachments. Saul was peculiarly so. However much of a favorite David may have been as a clever musician and a handy page, in the palace, it does not follow that Saul had ever cared enough about him to recognize his face when he saw him elsewhere and in different dress. Or, he may have preferred not to recognize David, as one who had been a member of his household, in that dress, and engaged in that foolhardy enterprise.

And we may rest assured that if the king, in the circumstances, had forgotten David, or chose not to know him, Abner was too good a courtier to remember ever having seen him before. Indeed, if Abner had really been ignorant as to who David was, we should have expected that he would have asked somebody and found out, and answered the king's question. He did no such thing. He was contented that himself and the king should suffer the pangs of ungratified curiosity in the matter till David got back and could tell his own story. Abner at least acts precisely as if he and the king were ignoring David, rather than ignorant of him.

The same author says that his elder brothers treated David "with a degree of petulance not likely to be displayed even by elder brothers to a youth who already stood well at court." But it was the most natural thing in the world that they should snub a younger brother, who, having been brilliantly received at court, was now, for some reason, retired. This view gives all the more meaning to their sneers, instead of the contrary.

On the supposition, then, that 1 Sam. xvi. 21, 22, 23, is to be regarded as describing events which strictly occurred earlier than the events described in the following chapter, the supposed difficulties of the case not only vanish on examination, but turn into picturesque strokes, making the narrative far more graphic, and far more true to life. They show that David was even then living a life of vicissitude, of great ups and downs, instead of the comparatively tame life which the other view would assign to him. But even were this not the case, there is a different cast of the narrative, quite probable in itself, which would entirely dispose of all the difficulties, and which at the same time fits in with the view already taken, in such a way that the two confirm one another instead of standing as separate hypotheses, either of

which might be independently adopted. It is very common in the Bible to mention in brief some group of events, following this up by a detailed account of some of the events thus epitomized. It is very easy to consider the narrative now under consideration as of this sort. In xvi. 21–23 is a general description of the honors David attained to, and the services he rendered while at the court of Saul. What follows may be regarded as the fuller recital of some of the incidents already alluded to in the epitome. If this be the case, David may have been known in court, previous to the affair of Goliath, only as a minstrel, his appointment as armor-bearer coming along later.

With or without this view of the passage, all of the difficulties of the Hebrew account vanish as soon as we look carefully at them. But if we take the shorter account by itself, it presents some difficulties which do not so readily disappear. If David had been serving as Saul's armor-bearer without interval and was present in camp in that capacity, how did it happen that he was there without equipment? How did it happen that he was there with his shepherd's wallet? (xvii. 40). The parts of this narrative which are retained in the Septuagint distinctly imply that there had been an interval between David's service at court and his appearance in camp. This implication so exactly fits the account given of that interval, in the Hebrew text, that the one has great weight to prove the historical truth of the other.

(W. J. B.)

DAVIDS, Thomas William Rhys, a British Orientalist, was born at Colchester, England, May 12, 1843. He was educated at the University of Breslau; entered the civil service in Ceylon, and held various judicial appointments in that colony; was called to the bar at the Middle Temple in 1877. He is the author of a work on *Buddhism* (1877), and has translated from the Pāli parts of *The Jātaka* (1877). He has also written various papers on Buddhistic, Jain, and Pāli subjects. His works include *Buddhism* (1878), a *Translation of the Fausböll collection of Buddhist Birth-Stories* (1880); *Buddhist Suttas from the Pali* (1881); *Hibbert Lectures* (1881). In 1883 there was published a translation of the Vinaya Texts from the Pāli by Mr. Davids and Hermann Oldenberg.

DAVIDSON, Lucretia Maria (1808–1825), an American poetess, was born at Plattsburg, N. Y., Sept. 27, 1808. Her parents were well educated, her father being a physician and her mother a poetess. From infancy Lucretia was subject to frequent attacks of sickness. When four years of age she learned to read, and soon took delight in making little books containing rude pictures and explanations in rhyme. These the child carefully concealed, and finally destroyed when they attracted attention in the family. The earliest of her compositions that has been preserved was written at the age of nine. In 1824, at the suggestion and expense of a friend of the family, she was sent to Mrs. Emma Willard's famous academy at Troy to complete her education. Here, however, her severe study, especially in preparing for a public examination, undermined her health, and being injudiciously allowed to continue her studies, she fell a victim to consumption, dying at Plattsburg, Aug. 27, 1825. Her poetical writings which have been preserved amount to 278 pieces, some of them of great length. Prof. S. F. B. Morse edited part of them in 1829 under the title *Amir Khan, and Other Poems*, adding a memoir of the author. The work was very favorably reviewed by Southey in the *Quarterly Review*. Another edition was published, with a *Life*, by Miss C. M. Sedgwick in 1843, and an illustrated edition in 1871.

DAVIDSON, Margaret Miller (1823–1838), an American poetess, was born at Plattsburg, March 26, 1823. Her career closely resembled that of her sister, Lucretia M. Davidson. Her education was conducted by her mother, the family frequently changing their residence for the sake of health. When she was ten years old she wrote in two days *The Tragedy of Alethia* for performance by herself and some little friends. Washington Irving says: "It contained within it sufficient of high character and astounding and bloody incident to furnish out a drama of five times its size." Her earnest desire was to fill her sister's place, and one of her most touching poems is addressed to Lucretia. Symptoms of consumption manifested themselves when she was twelve years old, and the disease pursued its course till her death, at Saratoga, Nov. 25, 1838. Her poems were published, with an interesting memoir, by Washington Irving, and the works of both sisters were collected in one volume in 1850.

DAVIDSON, Samuel, D. D., LL.D., an English theologian and biblical critic, was born near Ballymena, Ireland, in 1807. He entered the Royal College at Belfast in 1825, and was a diligent student in philosophy and biblical literature. Having been ordained as a Presbyterian minister, he was in 1835 appointed professor of biblical criticism and literature in the college from which he had graduated. A few years later he changed his views with regard to church government, and in 1842, when the Lancashire Independent College was founded at Manchester, he was called to fill the chair of biblical literature and the Oriental languages. He had already published a work on *Biblical Criticism*, and in 1843 he added to this his *Sacred Hermeneutics*. He was one of the contributors to the *Cyclopædia of Biblical Literature*, first issued in 1845 by Dr. John Kitto. His rapidly-increasing acquaintance with German writers led him to translate Gieseler's *Ecclesiastical History*, and the translation has been republished in America. In 1848 he issued a volume on *The Ecclesiastical Polity of the New Testament*, and this was followed by his greatest work, *An Introduction to the New Testament* (3 vols., 1848–51). In its successive editions this work indicates the negative tendency of his mind, his greater familiarity with German critical investigations, and his adoption of their results. In 1852 he rewrote his first book on *Biblical Criticism*, and in 1855 published another book on *The Hebrew Text of the Old Testament Revised*. He was now requested by the publishers of *Horne's Introduction to the Sacred Scriptures* to prepare a treatise to take the place of the second volume of that work, which had become in a measure obsolete. The result of this was a thorough discussion of *The Text of the Old Testament and the Interpretation of the Bible*, which appeared in 1856. A fierce attack was at once made upon it on account of its freedom in treating the Scriptures, though the author still held orthodox views in theology. The religious papers called for the removal of the professor from his chair, and as the college depended for its support on voluntary contributions the committee in charge of it became alarmed. Prof. Davidson resigned, and has since resided in London, devoting himself to study and authorship. His next work was an *Introduction to the Old Testament* (3 vols.), and in 1868 he published a revised edition of his *Introduction to the New Testament*. A still later edition ap-

peared in 1882. He has also translated *Fürst's Hebrew Lexicon*, adding a new preface. In 1873 an essay *On a Fresh Revision of the English Old Testament* appeared from his pen, and in 1875 he translated the New Testament from the latest Greek text of Tischendorf. An article which he contributed to the *Encyclopædia Britannica* was afterwards enlarged and published separately under the title *The Canon of the Bible, its Formation, History, and Fluctuations*, and has reached its third edition. His latest work is *The Doctrine of Last Things contained in the New Testament, compared with the Notions of the Jews and the Statements of the Church Creeds* (1882). Dr. Davidson's works continue to present the latest results of the investigations of German scholars as well as of his own researches. He is the only English theologian that has ever received the degree of D. D. from the University of Halle.

DAVIDSON, Thomas, a Scottish-American philosopher, born near Fetterangus, Aberdeenshire, Oct. 25, 1840. He graduated in 1860 at the Aberdeen University, with high honors in classics, and became a teacher. He removed in 1866 to Canada, and in the following year to St. Louis, Mo., where he edited the *Western Educational Monthly*. In 1875 he removed to Cambridge, Mass., and undertook a complete translation of the works of Aristotle. This led to a study of recent Italian philosophy, whose fruits appear in his *Rosmini* (1884), and various more recent works. He now resides at Orange, N. J.

DAVIDSON, William (1746–1781), a North Carolina general in the Revolution, was born in Lancaster co., Pa., in 1746. His father, who was of Irish birth, removed with his family to Rowan co., N. C., in 1750. William was educated at an academy at Charlotte, Mecklenburg county, and married a sister of Ephraim Brevard, the author of the Mecklenburg Declaration of Independence. When the war broke out he became major in one of the four regiments raised in North Carolina, fought at Monmouth and in other battles with distinction, and was promoted to the command of his regiment. After three years' service in the North he returned to his native State, and was made brigadier-general of the militia. Gen. Greene, during his famous retreat through the Carolinas in 1781, wishing Lord Cornwallis to be delayed at the Catawba River, requested Davidson's assistance, who called out the militia and posted them at the fords. A detachment of the British army, however, succeeded in crossing just below Cowan's Ford, where he himself was on guard with 300 men, and a fight ensued, in which both commanders were killed. Feb. 1, 1781. His name is perpetuated in Davidson College, founded by Presbyterians in 1837 near the spot where he fell.

DAVIES, John Llewelyn, an English clergyman and author, was born at Chichester, Feb. 26, 1826. He received his education at Repton School and Trinity College, Cambridge, graduating from the latter in 1848, and becoming a fellow of the college in 1850. Having been ordained in 1852, he was appointed incumbent of St. Mark's Church, Whitechapel, London, and four years later became rector of Christ Church, Marylebone. He is also chaplain in ordinary to the queen. He has been a follower of Maurice both in theology and practice. He took an active part in the London School Board, and was for some years principal of Queen's College, London. He assisted Dr. Vaughan in a translation of *Plato's Republic*, and has been a frequent contributor to periodical literature. Besides some volumes of sermons and a *Commentary on Ephesians, Colossians, and Philemon*, he has published *Theology and Morality, Belief and Practice* (1873), and *The Christian Calling* (1875). He was a contributor to Dr. William Smith's *Dictionary of the Bible* and *Dictionary of Christian Biography*.

DAVIES, Samuel, D. D. (1723–1761), an American Presbyterian minister, was born at Summit Ridge, Del., Nov. 3, 1723. He was of Welsh descent, and was educated by Rev. Samuel Blair (1712–1751) in his classical school at Fogg's Manor, Pa. Mr. Davies was licensed to preach in 1746, and in the following February was ordained as an evangelist to labor in Virginia. At that time nonconformists to the Established Church were much restricted in regard to worship, but Mr. Davies obtained a license to officiate. He soon received a call to be pastor in Hanover county, and accepted it, although his health was in a very precarious state. He had charge of seven places of worship in five counties. His glowing zeal, exemplary prudence, and impressive eloquence made his labors effectual in building up the Church. He had a controversy with Attorney-general Peyton Randolph, who maintained that the Act of Toleration did not extend to Virginia, but Mr. Davies's view was sustained by the king's council. In 1753 he was commissioned by the Synod of New York, in company with Rev. Gilbert Tennent, to visit Europe and solicit donations for the College of New Jersey. They visited Scotland together, and afterwards Mr. Tennent went to Ireland, while Mr. Davies made a tour through the principal cities of England. They were received with great favor, and were very successful in their mission. When Mr. Davies returned to Virginia in February, 1755, he found the colony in a great state of excitement, which was increased by the defeat of Gen. Braddock in July. On this subject he preached a sermon in August, and when publishing it added a note which has become famous by its reference to "that heroic youth, Col. Washington, whom I cannot but hope Providence has hitherto preserved for some important service to his country." When fears were entertained that the negroes might join the French and Indians, Mr. Davies exerted himself to prevent such a movement. His labors in Virginia resulted in the formation of the Presbytery of Hanover in December, 1755, which originally comprised the whole of Virginia and North Carolina. In 1758 he was elected president of the College of New Jersey at Princeton, and declined the position, but in the following year, being again elected, he resigned his charge and removed to Princeton, entering upon his duties as president July 26, 1759, though he was not formally inducted until Sept. 26. He brought to the college a high reputation for wisdom, piety, and eloquence, which he fully sustained during his brief connection with it. He died at Princeton, Feb. 4, 1761. He published several sermons and some *Letters on the State of Religion in Virginia, particularly among the Negroes*. His sermons were afterwards collected and published in five volumes (London, 1767). Several editions have since been issued in England and America; that of New York (1851) contains an essay on the *Life and Times of Davies*, by Rev Albert Barnes.

DAVIESS, Joseph Hamilton (1744–1811), an eccentric American lawyer, born in Bedford county, Va., March 4, 1774. His parents removed to Kentucky in 1779. He was educated in academy at Harrodsburg; served six months (1793) in an Indian war; entered upon an active legal practice at Danville in 1795, and acquired a national reputation as a lawyer.

He married a sister of Chief-Justice Marshall, and was afterwards United States attorney for Kentucky. The failure (Nov. 25, 1806) of his action against Aaron Burr, for making war against a foreign nation in time of peace (Henry Clay being Burr's counsel), was a serious blow to Daviess' popularity, which already had suffered from his determined Federalism. He afterwards entered the army, and, as colonel, commanded two troops of dragoons at the battle of Tippecanoe (Nov. 7, 1811), where he was shot through the body and mortally wounded, while leading a successful assault against the Indians. He died Nov. 8, 1811. He published *A View of the President's Conduct concerning the Conspiracy of* 1806.

DAVIS, Andrew Jackson, an American clairvoyant and author, was born in Blooming Grove, Orange co., N. Y., Aug. 11, 1826. His only instruction was received in five months at a primary school. Until his twelfth year he was employed on a farm; then his father removed to Poughkeepsie, N. Y., where young Davis was for five years a shoemaker's apprentice. In 1843, Mr. William Levingston of Poughkeepsie magnetized him by mesmeric passes, and immediately his remarkable clairvoyant powers were developed. He soon became widely known as the "Poughkeepsie seer," and for some years was much resorted to for medical examinations and prescriptions. He claimed that while in the clairvoyant state his mind seemed to expand so as to comprehend the most difficult subjects, and these he was able to treat in appropriate language. He afterwards found a new magnetizer in Dr. S. S. Lyons of Bridgeport, Conn., and in Nov., 1845, began the dictation of a series of discourses, which Mr. William Fishbough recorded. These lectures, 157 in number, were published in 1847 under the title *The Principles of Nature, Her Divine Revelations, and a Voice to Mankind.* After the publication of this work he separated himself from the magnetic control of others, and has since claimed to enter the clairvoyant state by will. He teaches that this condition is superior to the superinduced trance state, as in the latter the individuality is suppressed, while in the voluntary trance the faculties are expanded and exalted. Mr. Davis has published thirty volumes, among which are—*The Great Harmonia* (5 vols.), *Stellar Key to the Summer Land, Arabula, Harbinger of Health, Death and the After-Life, Views of our Heavenly Home.* These are expansions and applications of the doctrines contained in his first volume. His system is called the "harmonial philosophy." One of his volumes, *The Magic Staff,* is an autobiography. Most of his works have been translated into German under the patronage of a wealthy Russian, Alexander Aksákof, aided by Prof. Wittig of Breslau and Wilhelm Besser of Leipsic. Mr. Davis is now president and lecturer of an harmonial association in New York (incorporated May, 1881), and delivers discourses the principles of which he professes to obtain by independent clairvoyance.

DAVIS, Charles Henry (1807–1877), an American admiral, was born in Boston, Jan. 16, 1807. His father, Daniel Davis, was solicitor-general of Massachusetts, and his mother a sister of Rev. James Freeman of King's Chapel. He entered Harvard College in 1821, but remained only two years. Having been appointed acting midshipman in 1823, he served on a three-years' cruise in the Pacific, was then ordered to the West Indies, and in 1829 sailed on a two-years' cruise in the Mediterranean. After further service in the Pacific he was commissioned lieutenant in 1834. In 1842 he became connected with the U. S. Coast Survey, and passed seven years in this duty, rendering specially important service to the commercial interests of the country by his discovery and survey of dangerous shoals off the southern coast of New England. He was subsequently engaged in the survey of the harbors of Boston, New York, Charleston, and other places. His mathematical ability caused him to be placed in charge of the new *American Ephemeris and Nautical Almanac.* In 1854 he was promoted to the grade of commander, and in 1856 commanded the sloop St. Mary's on the Pacific station. During this cruise he received the surrender of the filibuster Gen. Walker at Rivas, and took possession for the United States of some islands in the Pacific. At the outbreak of the Civil War, Commander Davis was stationed at Cambridge, Mass. He was ordered to Washington, and appointed on a board of military and naval officers to report on the condition of the Southern coast with a view to offensive operations. The result was the expedition to Port Royal, S. C., in which Davis sailed as chief of staff to Captain S. F. Dupont, and rendered valuable assistance by his intimate knowledge of the hydrography of the Southern coast. He commanded the expedition to close the entrance to Charleston harbor by sinking the stone fleet in the main channel, and served on the expeditions against Fort Pulaski and Fernandina. Being next placed in command of the Mississippi gunboat flotilla in April, 1862, he defeated a fleet of gunboats off Fort Pillow, May 10, and on June 6th destroyed the Confederate fleet and captured the city of Memphis. Then joining Farragut at Vicksburg, he served in various expeditions until July, 1862, when he was appointed chief of the newly-established bureau of navigation in Washington. In Feb., 1863, he received the thanks of Congress and was promoted to rear-admiral. In 1865 he became superintendent of the Naval Observatory, but in 1867 was placed in command of the Brazil squadron, and after two years' service at sea took charge of the navy-yard at Norfolk. In 1874 he again assumed the direction of the Naval Observatory. He died at Washington, Feb. 18, 1877. He was distinguished for his scientific attainments, and was a member of the National Academy of Sciences and other scientific associations. Harvard College conferred on him the degree of A. M. in 1841, and that of LL.D. in 1868. Among his publications are *The Coast Survey of the United States* (1849), a translation of Gauss's *Theoria Motus Corporum Cœlestium* (Boston, 1857), several astronomical memoirs and tables, and the *Narrative of the North Polar Expedition of the U. S. S. Polaris* (1876).

DAVIS, David, LL.D., an American statesman, was born in Cecil co., Md., March 9, 1815. He was educated at Kenyon College, Gambier, O., and studied law at Lenox, Mass., and at Yale College law-school, Conn. He removed in 1836 to Bloomington, Ill.; served in the State legislature, 1844–45; was in the convention of 1847 for framing a new State constitution; served, 1848–62, as a judge in a State court, being twice re-elected during his term of service. He was appointed by President Lincoln in 1862 an associate justice of the United States Supreme Court. He resigned this office in 1877 on being elected United States Senator from Illinois. When in 1881 Mr. Arthur became President, Senator Davis was chosen president of the Senate, and was thus acting vice-president of the United States. On the expiry of his term in 1883 he retired to private life. Note.—Mr. Davis died June 26, 1886.

DAVIS, GARRET (1801–1872), an American lawyer and statesman, was born at Mount Stirling, Ky., Sept. 10, 1801. He received a classical education, and was employed as a writer in the courts of his district. He was admitted to the bar in 1823, and soon acquired distinction and an extensive practice. In 1833 he was elected to the State legislature, and in 1839 was a member of the State constitutional convention. In the same year he was elected to Congress, where he remained till 1847. He was an intimate personal and political friend of Henry Clay, and an active member of the Whig party. In 1845 he defeated Thomas F. Marshall after a hard-fought campaign. At the close of this term he devoted himself to agriculture, in regard to which he was a high authority in his State. At the outbreak of the Civil War he exerted himself to prevent the secession of Kentucky, and was elected to the United States Senate as an Old-Line Whig succeeding John C. Breckinridge. He served on the committees on foreign relations and on the Territories. Though small and delicate, he was noted for his powers of endurance, and often spoke for hours. He was passionate, enthusiastic, and fierce in invectives. He remained a Senator till his death, which took place at Paris, Ky., Sept. 22, 1872.

DAVIS, HENRY WINTER (1817–1865), an American statesman, was born at Annapolis, Md., Aug. 16, 1817. His father, Rev. Henry Lyon Davis, an Episcopal clergyman, was then president of St. John's College, Annapolis, but was afterward removed from his position on account of his Federal politics. He was a man of ability and learning, fluent in conversation and writing, but without the least pretension to oratory. Henry was taught chiefly by his father till he went to Kenyon College, Ohio, where he graduated in 1837. His father, having died in the previous year, had left him a few slaves, but he refused to receive any profit in this way, and tendered to each one of them a deed of manumission whenever the law would allow. After graduating he sought employment as a tutor, and in Oct., 1839, having received some assistance from his aunt, went to the University of Virginia, where he followed its higher course and studied law. Having commenced practice at Alexandria, Va., in 1841, he soon became known as an able lawyer. In 1850 he removed to Baltimore, and at once secured a foremost place at its bar. He was elected to Congress as a Whig in 1854, and in 1856 and 1858 as a member of the American party. In 1859 he ended the long contest for the Speakership of the House of Representatives by voting for Mr. Pennington, the Republican candidate. In the presidential campaign of 1860 he supported John Bell, the "Constitutional Union" candidate, but when Pres. Lincoln, immediately after the attack on Fort Sumter, called an extra session of Congress, Davis announced himself as a candidate for Congress on the basis of "the unconditional maintenance of the Union," and exerted himself against a secessionist mob that had gathered in Baltimore. He was defeated as a candidate, but his efforts did much to prevent the secession of his State. In 1863 he published an address to the people of Maryland, urging upon them immediate emancipation of their slaves by an amendment of the State constitution; and he followed this up in a remarkable campaign, allowing himself no reprieve from labor till the object was accomplished. In that year he was again elected to Congress, where he was made chairman of the committee on foreign affairs. In May, 1864. he joined with Senator Benjamin F. Wade in a public protest against Pres. Lincoln's refusal to sign a bill with regard to reconstruction, as being an infringement of the rights of Congress. At the close of the war he urged that the right of suffrage should be given to the negroes. He died after a brief illness, at Baltimore, Dec. 30, 1865. He was an orator of remarkable ability, always speaking to instruct, and always securing the charmed attention of his hearers. His most striking characteristics were devotion to principle and indomitable courage. In 1853 he published *The War of Ormuzd and Ahriman in the Nineteenth Century.* In 1867 a memorial volume of his *Speeches and Addresses* was published, with an oration giving a sketch of his life and services, by Hon. J. A. J. Cresswell.

DAVIS, JEFFERSON, was born in Christian co., Ky., June 3, 1808, was graduated at West Point in 1828, and resigned from the army in 1835. In 1845 he entered Congress from Mississippi, his adopted State, but resigned to take command of the First Mississippi rifle regiment in the Mexican War, which he retained until hostilities were at an end. In 1847 he became United States Senator, but in 1851 resigned to become the secession candidate for governor of his State against Henry S. Foote. In this contest he was defeated, but was at once re-elected to the Senate. He again resigned, became Secretary of War under Pierce (1853–57), and was then re-elected to the Senate. Jan. 21, 1861, he left the Senate on the secession of his State, and during the next month became President of the Southern Confederacy (see CONFEDERATE STATES). At the downfall of the rebellion he was captured by a cavalry force in Georgia, May 10, 1865, and was imprisoned for two years in Fortress Monroe, but was then released on bail, and has not been tried.

Davis's career in the Senate laps on and completes Calhoun's, and involves the whole extreme Southern view of the relations of the Federal Government to slavery in the Territories. The Calhoun theory, as perfected after 1833, held that the Constitution was a compact formed by States only; that these entered the "convention of 1787," which framed the Constitution, as sovereign States, and came out of it as sovereign States; that any new territory acquired was not "national" territory, to be governed absolutely by Congress, but "the common property of all the States," to be governed in such a manner as to maintain the rights of all the States in it; that Congress had no right so to legislate as to exclude either free-State settlers or slave-State settlers from the territory; and that the Wilmot proviso, or any similar legislation, was therefore unconstitutional (see FREE-SOIL PARTY). Two awkward facts, as yet unimpeached, stood in the way: the Congress of the Confederation had in 1787 prohibited slavery in the territory north-west of the Ohio; and in 1820, at the admission of Missouri as a State, Congress had prohibited slavery in the rest of the territory west of the Mississippi and north of latitude 36° 30′, the "Missouri-compromise line." The last was particularly awkward, since Calhoun was then in the Cabinet and advised the President to sign the bill thus prohibiting slavery; but this circumstance was unknown when Calhoun's Senate resolutions of Dec. 27, 1837, put his theory into settled form, and was usually ignored afterward. Of course it would follow from the theory that the ordinance of 1787 and the Missouri restriction of 1820 were both invalid, and so the Supreme Court in effect decided, twenty years afterward, when it adopted Calhoun's theory; but at first this consequence was unthought of. As

cepting as facts what had been done, the Southern leader aimed only at preventing interference with slavery in the remaining territory, the District of Columbia. One object was so to demonstrate the incapacity of Congress to abolish slavery in the District as to make out a case for refusing to receive petitions for such action; and when Congress, after 1842, yielded as far as to receive the petitions, the Calhoun theory slumbered with the agitation until the Mexican annexation in 1848.

When the preliminaries to negotiations with Mexico in 1846–47 showed that territory was to be acquired from Mexico as the price of peace, a proviso forbidding slavery therein was at once brought in, and for four years became the central point of politics. Again Calhoun introduced his resolutions of 1837 in a more succinct form (Feb. 19, 1847). He did not now venture to press them to a vote, but within three years the question-begging phrase, "common property of all the States," had brought the whole South into line with Calhoun and had made Northern Democrats chary of opposition to him. Finally, the compromise of 1850 was elaborated: it comprised a fugitive-slave law to satisfy the South, the admission of California as a free State to satisfy the North, an evasion of any provision as to slavery in the other newly-acquired Territories (Utah and New Mexico) to satisfy both sections, a prohibition of the slave-trade, but not of slavery, in the District of Columbia, as a sop to the abolitionists, and a grant of $10,000,000 to Texas in order to gain votes generally from members interested in Texas bonds. Calhoun's original theory was thus at last successful: Congress had *not* so legislated as to "proscribe" any citizen of a slave State from going to a Territory with his property.

But before this was settled Calhoun had added an extension to his original edifice—the assertion that the Constitution extended to the Territories as well as to the States, and that the slaveholding immigrant was entitled to be *protected* in the enjoyment of his "property." On Feb. 20, 1849, while the Territorial question was still unsettled, Senator Walker of Wisconsin moved to amend an appropriation bill by providing that the Constitution should be "extended over and given full force and efficacy" in the Territories. Webster at once informed him that "the thing was utterly impossible," that the Constitution was made for States, not for Territories, and that the Territories were not a part of the political United States. Calhoun reminded him that the Constitution pronounced itself to be the supreme law of the land, to which Webster only answered, "What land?" Calhoun, after arguing that it was the territorial not the political land, remarked that he had been told that some decision of a United States court sustained Webster's doctrine, but that he was "incredulous of the fact." Webster replied briefly that he could "remove the gentleman's incredulity very easily, for he could assure him that the same thing had been decided by the United States courts over and over again for the last thirty years." In all his many conflicts with Webster, Calhoun never showed to so little advantage as in this; and though the motion was carried in the Senate by an almost entirely sectional vote, the whole weight of argument was against it. The Senate amendment was lost in the House, but it remained the Southern doctrine that the Constitution, with its compromises, its protection to property, its prohibition of depriving any person of "property" without due process of law, and its implied obligation upon Congress to legislate for the protection of "property, extended to the Territories *proprio vigore*. It mattered not that the Senate amendment had failed or that the compromise of 1850 had not recognized its principle: both these were only failures to pass declarative acts, and could not affect the essential nature of the Constitution itself. If Congress had failed to pass a proper declarative act in 1850, it had at least pursued a middle line, and had not unconstitutionally legislated against the Calhoun theory with its new extension. It only remained to seize the first opportunity to extort from Congress a plain declaration of the existence and supremacy of the Constitution in the Territories; and in this Jefferson Davis was Calhoun's Elisha. He had stated his *ultimatum* in round terms in Jan., 1850, as follows: "We maintain that it is the right of the people of the South to carry this species of property to any portion of the Territories of the United States—that it rests, under the Constitution, upon the same basis as other property; but we are willing, in a spirit of compromise and in compliance with the past acquiescence of the States, to restrict it by the parallel of 36° 30′ north" [that is, to extend the Missouri-compromise line to the Pacific]. And though, when the *ultimatum* had been refused, he was defeated by Foote in Mississippi on a platform of secession as an answer to the refusal; though McDonald was defeated by Howell Cobb in Georgia on the same issue; though any secession candidate would have been similarly defeated in any State outside of South Carolina,—there was a weakness in the Southern mind for this view, that the Constitution, as a protector of "property," was in full force in the Territories. The platforms adopted by Southern conventions, particularly those of Georgia, and by the Nashville convention, all assert a "right" to carry slavery into the Territories, without expressly basing it on the extension of the Constitution to the Territories. All that was necessary was to harp upon the constitutional assertion long enough, and the hearers would in time accept it.

The passage of the Kansas-Nebraska bill in 1854 promised general non-intervention by Congress with slavery in the Territories; but if the promise was kept to the ear, it was broken to the hope of the mass of Southerners, and particularly of their leaders. Intervention by immigration was more effective than Congressional intervention. Kansas was not only to be a free State instead of a slave State; it was to be a Republican State instead of a Democratic State. From the moment that this result became certain the Calhoun-Davis theory was the only alternative for the leaders to adopt, and their political existence depended upon its ratification by their people. Most opportunely—so opportunely that the case was widely but mistakenly considered a factitious one—the decision of the Supreme Court in the "Dred Scott case" came to their assistance. Dred Scott was a Missouri slave whose owner took him in 1834 to Illinois, where slavery was prohibited by the ordinance of 1787 and by the State constitution, and in 1836 to Upper Louisiana, or Wisconsin (now Minnesota), where slavery was prohibited by the Missouri compromise. Having been taken back to Missouri, and there whipped for some offence, Dred brought suit for assault and battery, claiming to have become a free man by his residence in free territory. He obtained a verdict, but the State supreme court reversed it on appeal. In the mean time, the owner had sold him to John F. A. Sandford of New York, and Dred brought suit in a Federal court, as the parties were now "of different States." Thence by writ of error the case went to the

Supreme Court, whose decision was given in March, 1857. It sustained the original Calhoun theory firmly, that negroes were no part of the political "people of the United States" in the view of the framers of the Constitution; that they were "property," not persons, with no more rights than the white race chose to allow them; that, a Territory being a part of the United States, the Government and the citizen both enter it under the authority of the Constitution, with their respective rights defined and marked out; and that the Federal Government "can exercise no power over his [the citizen's] person or property beyond what that instrument confers, nor lawfully deny any right which it has reserved." It follows from this that, as far as prohibitions of slavery went, the ordinance of 1787 had become a dead letter at the adoption of the Constitution, and that the Missouri compromise of 1820 was unconstitutional and void. So far, Calhoun's original theory was followed in all its consequences. But it does not need a very close scrutiny of the paragraph specially quoted above to show that the final Calhoun-Davis theory, if it was not here in full flower, was at least sprouting. Grant that slaves were property, that the right to such property was reserved to the citizen by the Constitution, and that the Federal Government could not lawfully deny his right in the Territories, and no great headway is needed to carry the court to the assertion that the Government may not allow others to deny his right; and that means nothing less than protection to slavery in the Territories.

On this decision Southern leaders took firm hold. Hardly any three of the members of the court had agreed on any one point, and the opinions above given were outside of the question which the court was to decide; but it was sufficient that the court had decided against Dred Scott, and that the nominal opinion of the court contained quotable paragraphs to make the Constitution the law of the Territories. Before the close of Buchanan's term the *Nicholson* which Davis had presented in 1850 was offered again by him in seven resolutions, which were passed by the Senate, May 24–25, 1860. They were much like those of 1837 and 1847, except the fifth, which declared that "if experience should at any time prove that the judicial and executive authority do not possess means to ensure adequate protection to constitutional rights in a Territory, and if the Territorial government should fail or refuse to provide the necessary remedies for that purpose, it will be the duty of Congress to supply such deficiency." The whole made up the new Southern programme: 1 that neither Congress nor a Territorial legislature could prohibit slavery in a Territory; 2 that both were bound to protect slavery; 3 that the right of the people of the Territory to prohibit slavery only accrued when they came to form a State constitution; and 4 that Congress was then bound to admit the State with or without slavery as its people should elect. This was the platform upon which the Cotton State delegates insisted at the Charleston convention, and the refusal of the convention to adopt it led to the withdrawal and the breaking up of the convention and Democratic Party. Indeed, Mr Davis's resolutions when introduced, March 1, 1860, were as much an advance to the convention of the following month as to the country at large.

Was Jefferson Davis a traitor? The question of course includes the status of all other persons who took part in the rebellion. Both his accusers were [illegible] as far as the more active elements of the two are concerned, the answer must be hesitating. It must be remembered that the doctrine of State sovereignty acknowledged no primary allegiance of the citizen to the United States: his primary allegiance was due to his State, and his *obedience* was due to the United States because his State commanded it. When the State seceded the citizen's allegiance was still due to his State, and he obeyed his State both in becoming a citizen of the Confederate States and in making war on the United States. The Constitution's definition of treason, "making war against" the United States or "adhering to their enemies, giving them aid and comfort," must be conceded to have some moral limitations in its application to men who conscientiously maintained the allegiance which they believed to be due to their State. The war was waged by the United States for the purpose of maintaining the allegiance due the nation; and if it is an evil that no executions for treason took place, the nation must accept it as the penalty for an eighty years' *laches* in permitting that undisputed impeachment of the allegiance due to it which was the basis of secession. Future experimenters have had fair warning: Jefferson Davis had less than none. The case is thus strongly put by Dr. Brownson: "Treason is the highest crime and deserves exemplary punishment, but not where there has been no treasonable intent; where they who committed it did not believe it was treason, and on principles held by the majority of their countrymen, and by the party that had generally held the Government, there really was no treason. Concede State sovereignty, and Jefferson Davis was no traitor in the war he made on the United States, for he made none till his State seceded. He could not then be arraigned for his acts after secession, and at most only for conspiracy, if at all, before secession." It was the consciousness of its own previous shortcoming that led the nation to refrain from treason trials after the suppression of the rebellion.

See Alfriend's *Life of Davis*; Craven's *Prison-Life of Davis*; Pollard's *Life of Davis and Secret History of the Confederacy*; Davis's *Rise and Fall of the Confederate Government*; 3 Calhoun's *Works*, 140–202 (resolutions of 1837); 4 Calhoun's *Works*, 338–382 (resolutions of 1847); 16 Benton's *Debates of Congress*, 306, 396; Cluskey's *Political Text-Book*, 585–600 (Southern convention platforms of 1850); Dred Scott *vs.* Emerson, 15 *Mo.*, 682; Dred Scott *vs.* Sandford, 19 *How.*, 393; Benton's *Examination of the Dred Scott Decision*; 2 B. R. Curtis's *Works*, 213; Greeley's *Political Text-Book* (Senate resolutions of 1860), and 31 (Southern platform at Charleston); Brownson's *American Republic*, 338; Venable's *Republic of Republics*, 408–424; Schucker's *Life of Chase*, 534–545; and authorities under Democratic Party, II., III., and Free-Soil Party. (A. J.)

DAVIS, John Chandler Bancroft, an American jurist and diplomatist, was born at Worcester, Mass., Dec. 29, 1822. His father, John Davis, LL.D., was for three terms United States Senator from Massachusetts, and was noted for his advocacy of a protective tariff. The son graduated at Harvard College in 1840, and having studied law commenced practice. In 1849 he went to London as secretary of legation, his uncle, Hon. George Bancroft, the historian, being at that time minister to England, but resigning soon after. Mr Davis acted as *chargé d'affaires* until Mr. Abbott Lawrence was appointed, when he again became secretary of legation, and remained until Dec., 1852. He then settled in New York as a lawyer, and in 1854 became the American correspondent of the London *Times*, and served as such until Nov., 1861, when he was compelled to leave America on account of ill-

ealth caused by overwork. After a few years he sumed the practice of his profession, and in 1869 as elected to the legislature of New York. At the mmencement of Pres. Grant's administration Mr. avis was appointed assistant Secretary of State, and ecame American secretary in the joint commission hich concluded the Treaty of Washington in the ring of 1871. In the summer of that year he pre-ared the American case for submission to the tribunal f arbitration for the settlement of the Alabama claims. n the autumn he went to Geneva as the agent of the Inited States at the meeting of the tribunal, and acted i that capacity throughout its proceedings. Return-ng to the United States in Jan., 1873, he resumed his lace as assistant Secretary of State, and in July, 874, was appointed United States minister to Ger-any. This position he resigned in the spring of 877, though at the request of the Government he re-ained in Berlin until the autumn. On his return to he United States he was appointed a judge of the ourt of claims, taking his seat on the bench in Jan., 878. In Dec., 1881, he again became assistant Sec-tary of State, but resigned after holding the position x months. His publications are—a law-book called *The Massachusetts Justice* (Worcester, 1847), *The Case f the United States at Geneva* (1872), *Mr. Sumner, ie Alabama Claims, and their Settlement* (New York, 878), *Les Tribunaux de Proces des Etats Unis* (Paris, 878). He has also contributed to *Fraser's Magazine* nd the *Edinburgh Review*, and furnished notes to a *evised Edition f the Treaties of the United States* 1873).

DAVIS, NATHAN SMITH, LL.D., an American physician and author, was born at Greene, Chenango co., [. Y., Jan. 9, 1817. He spent his early years on a rm, attending school in the winter. At sixteen he ent to Cazenovia Seminary, and at seventeen began is medical studies. He graduated from Fairfield ledical College in Jan., 1834, and soon after settled s a physician at Binghamton, N. Y. Besides attend-ng to his practice, he lectured at Binghamton Acad-my and wrote for the medical journals. In 1838 and 841 he won prizes offered by the New York State edical society for essays on *Diseases of the Spinal olumn* and *The Physiology of the Nervous System*. is article on the *Physiology of the Brain*, which ap-eared in the *American Journal of Insanity* for 1844, ttracted attention in Europe. Dr. Davis was secre-ary of the Broome county medical society and delegate o the State medical society, and it was largely due to is efforts that a national medical convention was alled in 1846. He is therefore regarded as the father f the American Medical Association, and has twice een its president—in 1864 and 1865. In July, 1849, e was elected professor of physiology and pathology a Rush Medical College, Chicago, and removed to hat city in September. A year later he was trans-rred to the chair of the practice of medicine, and be-ides his duties at the college was active in forming the hicago medical society and the Illinois State medical ociety. He also labored diligently to promote the eneral welfare of Chicago. In 1859 he founded the hicago Medical College, on the principle of graded lasses, a six months' lecture-term, and a three years' ourse before graduation. This principle has been ound successful, and has since been adopted by five ther American institutions. The college founded by r. Davis now forms the medical department of the orth-western University, and he is still its president. He also aided in founding the Chicago Academy of Sciences and the Washington Home for Inebriates, of which he was president till 1861. He received the honorary degree of A. M. in 1871, and that of LL.D. in 1880, from the Illinois Wesleyan University. Dr. Davis became editor of the *North-western Medical Journal* in 1855, and in 1860 he started the *Medical Examiner*, of which he is still editor. He has published *A Text book of Agriculture* (N. Y., 1840); *Lectures on Free Medical Schools* (Chicago, 1849); *History of Medical Education and Institutions in the United States* (Chicago, 1851); *Assimilation, Nutrition, and Animal Heat, Effects of Alcoholic Drinks on the Human System* (Chicago, 1851); *History of the American Medical Association* (Philada., 1855); *Clinical Lectures* (Chicago, 1873); *The Practice of Medicine* (Chicago, 1882), the last a volume of more than 1000 pages.

DAWKINS, WILLIAM BOYD, F. R. S., an English geologist and palæontologist, was born at Buttington parsonage, Welshpool, Montgomeryshire, Dec. 26, 1838. He is the son of Rev. Richard Dawkins, and was at first intended for the Church. After a preliminary training at a school in Lancashire he entered Jesus College, Oxford, where he soon showed a special fondness for natural science, especially geology. For nearly two years he pursued a course of medical study, but in 1859 he was led by the discovery of fossil bones in Wookey Hole into that course of investigation which has given him fame. He thoroughly explored that cave, and in 1860 laid the results before the Geological Society, of which he was elected a fellow. This was the first of a series of explorations which have since been carried on in various parts of Great Britain, and have led to a great increase of knowledge of pre-historic times. Mr. Dawkins in 1861 was appointed on the staff of the geological survey of Great Britain, and for eight years was engaged chiefly in the south-eastern part of England. In 1869 he was appointed lecturer on geology in Owens College, Manchester, and curator of the museum in that city. In 1873 he was made professor of geology and palæontology in Owens College, which now forms part of Victoria University. In discharge of his duties he has instituted and carried out a system of field lectures by which students are trained in practical geology. After a thorough examination of the fossil collections in the museums of continental Europe, Prof. Dawkins published his interesting work on *Cave-Hunting: Researches on the Evidences of Caves respecting the Early Inhabitants of Europe* (1874). He had also been active as a consulting geologist, and in 1875 visited Australia and the United States to examine the gold- and silver-mines. Further researches in the caves of Great Britain led to his second important publication, *Early Man in Britain, and his Place in the Tertiary Period* (1880). In that year he returned to the United States to deliver a course of lectures before the Lowell Institute of Boston, and visited the important museums of the Eastern States, especially those made by Profs. Agassiz, Marsh, and Cope. He has consolidated and thoroughly organized the natural-history collections in Manchester. Besides his contributions to the publications of the Geological Society, Prof. Dawkins has written many articles for the literary reviews and magazines, and has lectured in all the principal towns of England and Scotland. He is a member of various scientific societies in England, Germany, and America. Throughout his career he has shown not only devotion to science, but excellent administrative and business capacity. He has taken part in many important public enterprises, and is one of the

principal supporters of the building of a tunnel under the English Channel.

DAWSON, Sir John William, LL.D., F.R.S., a Canadian geologist and naturalist, was born at Pictou, Nova Scotia, in Oct., 1820. During his academic training at the College of Pictou he made extensive collections in the natural history of his native province. Having devoted himself to geological research he accompanied Sir Charles Lyell during his tour in Nova Scotia in 1842. He afterwards attended the University of Edinburgh for the purpose of studying more thoroughly the natural sciences, and graduated there in 1847. During his stay in Scotland and after his return he published a number of valuable papers embodying the results of his researches. Being appointed superintendent of education for Nova Scotia in 1850, he took part in establishing a normal school and in improving the other schools and institutions of learning. In 1855 he was appointed principal and professor of natural history in McGill College and University at Montreal. He had also charge of a normal school, and had much to do with moulding the school-system of his country. The latter position he resigned in 1870, but he still retains the former, in which he has been remarkably successful. In 1855 he published *Acadian Geology*, a full account of the geology of the maritime provinces of British North America. An enlarged and improved edition appeared in 1868. He continued his researches in Nova Scotia, examining the silurian and Devonian rocks, and devoting much attention to fossil botany. Besides numerous scientific papers he published *Archaia, or Studies on the Cosmogony and Natural History of the Hebrew Scriptures* (1859), a work which shows familiarity with the Hebrew language and Biblical literature. In his work on *The Air-Breathers of the Cold Period* (1863) he gives an account of fossil reptiles found in Nova Scotia. In connection with his educational work he prepared a *Hand-book of Scientific Agriculture* (1864). In the same year he made his most interesting scientific discovery, that of *Eozoon Canadense*, by which he proved that the rocks of the Laurentian age, heretofore supposed to be devoid of animal remains, really contained the oldest forms of animal life. For the name Azoic, previously applied to them, he now proposed Eozoic. He has since continued his investigations, and by his labors the number of known species of Post-pliocene fossils has been raised from about 30 to more than 200. In 1870, during his visit to England, he lectured before the Royal Institution and presented papers to scientific societies. In the same year his *Hand-book of Canadian Zoölogy* appeared, being followed by a *Report on the Silurian and Devonian Flora of Canada*, and another on the geology of Prince Edward Island. *The Story of the Earth and Man* (1873) is a popular view of the geological ages, with incidental discussion of the various theories and questions connected therewith. A course of six lectures delivered in New York in the winter of 1874–75 was published under the title *Science and the Bible* (1875). In *The Dawn of Life* (1875) the facts relating to the oldest fossils are set forth in popular style. Principal Dawson's later works are *The Origin of the World* (1877), *The Chain of Life* (1880), *Fossil Men* (1880), *Facts and Fancies in Science* (1882), *Egypt and Syria* (1885), *Science in Bible Lands* (1888), and *Modern Ideas of Evolution* (1890). Being a firm believer in Divine revelation, he has maintained at all times the harmony between the teachings of the Bible and science. While accepting the doctrine of evolution to a certain extent, he has opposed with vigor the extreme materialistic views of some of its supporters. He has received from McGill University the degree of LL. D., and has been elected a member of many scientific societies on both sides of the Atlantic. In 1882 he was chosen president of the American Association for the Advancement of Science, and also president of the Royal Society of Canada. He was president of the British Association at Birmingham in 1885. In 1884 he received the honor of knighthood.

DAYTON, a city of Ohio, county-seat of Montgomery co., on the E. bank of the Great Miami River, at the confluence of Mad River, 60 miles by rail N.N.E. of Cincinnati. The following railways accommodate the business of the town: the Cincinnati, Hamilton, and Dayton; the Cincinnati Northern; the Cleveland, Columbus, Cincinnati, and Indianapolis; the Dayton and Union; the Dayton and Michigan; the New York, Pennsylvania, and Ohio; the Pittsburg, Cincinnati, and St. Louis; and three divisions of the Toledo, Cincinnati, and St. Louis; the Ohio Canal passes through the town. From Dayton some 36 macadamized or well-metalled roads radiate. The streets are 100 feet wide. The court-house is built of white limestone. There is a costly stone jail, a city orphanage, a county alms-house, a State lunatic asylum, some 50 churches, a high-school, St. Mary's Institute (Roman Catholic), the divinity school of the United Brethren in Christ, the Cooper Academy for Ladies, a music-hall, an opera-house, a free public-school library of 15,000 volumes. There are several large Catholic institutions, including parish schools and a commodious hospital. The city school-system is very complete. Mad River affords a great amount of water-power, utilized in extensive manufactories, turning out railroad-cars, farm-implements, paper, hollow-ware, stoves, cotton-goods, linseed oil, woollens, flour, machinery, doors, sash, blinds, and other goods in great variety. Several of the churches are of noteworthy architecture. In the vicinity are important quarries of building-stone. Not far from the city is a national soldiers' home, a large and important institution. Dayton has a very large local trade. There are 2 national banks and 2 State banks; 2 daily, 4 weekly, besides other periodicals are issued here. Dayton was founded in 1796, incorporated in 1805, and chartered as a city in 1841. Popul.: in 1870, 30,473; in 1880, 38,678; in 1890, 58,868.

DAYTON, William Lewis (1807–1864), an American statesman, was born at Basking ridge, N. J., Feb. 17, 1807. He graduated at Princeton College in 1825, and was admitted to the bar in 1830. In 1837 he was elected to the State Senate, and in 1838 was made a justice of the State Supreme Court. He was United States Senator from 1842 to 1851, and attorney-general of New Jersey from 1857 to 1861. He had been a Whig, but was firmly opposed to the extension of slavery in the Territories. He was in 1856 the Republican candidate for the Vice-Presidency. In 1861 he was appointed by President Lincoln minister to France. He died in Paris Dec. 1, 1864.

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